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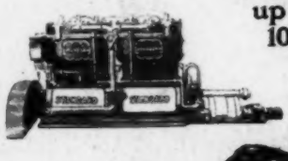

"Power up to 1000"

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The National Magazine **MOTOR BOATING** of Motor Boating

January, 1912 Vol. IX. No. 1.

Entered as second-class matter at New York, N. Y., Post Office. Copyright, 1911, by New Publication Company

Published Monthly by NEW PUBLICATION COMPANY, 381 FOURTH AVENUE, NEW YORK CITY

G. L. Willson, President George von Utassy, Treasurer C. J. Shearn, Secretary

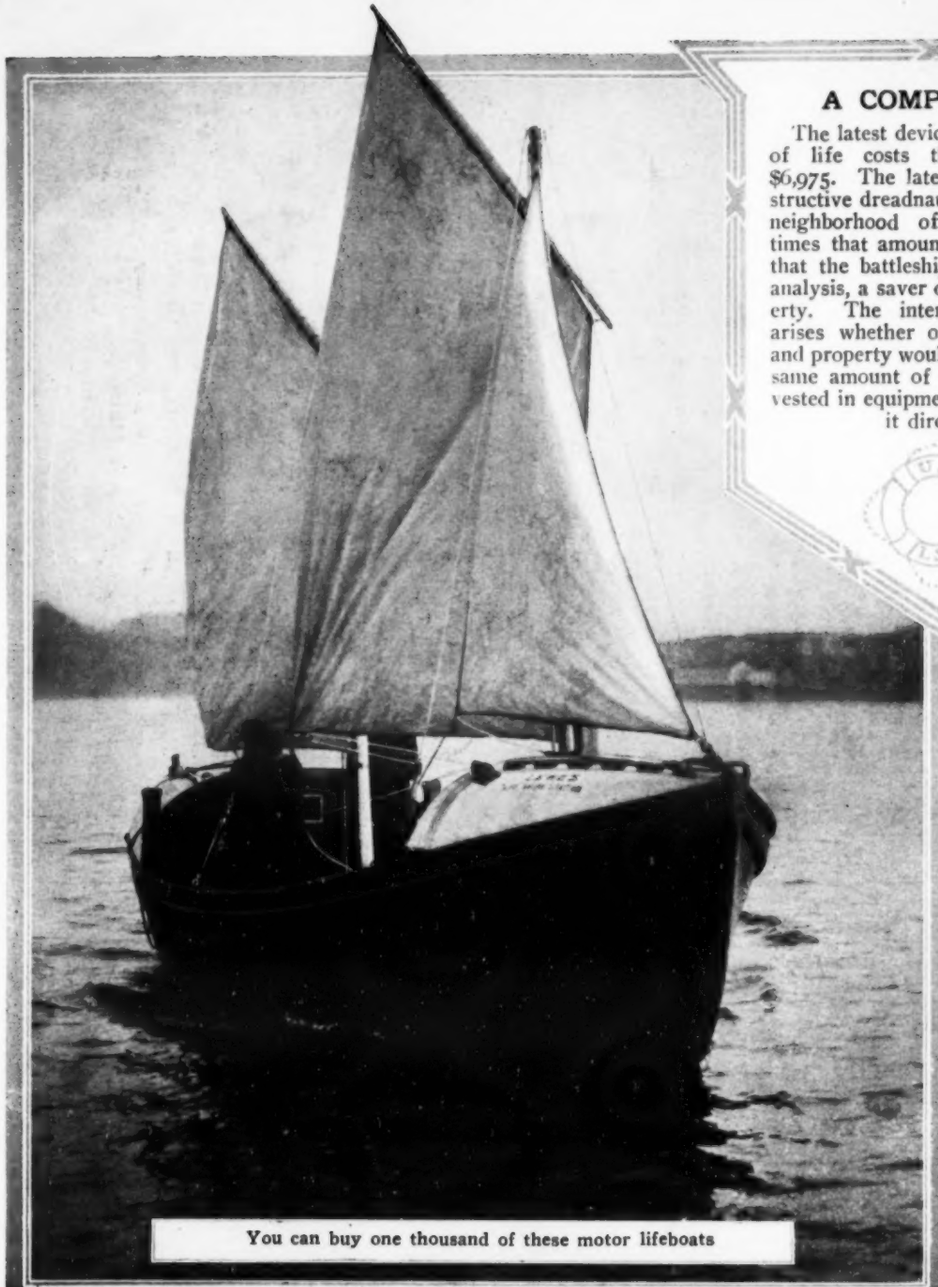
Telephone: 7100 Madison Square Cable Address: Motoria

25 cents a copy. Subscription, $3.00 a year. *Foreign Postage, $2.00.*

European Agents: Saarbach's News Exchange, Mainz, Germany.

A COMPARISON

The latest device for the saving of life costs the Government $6,975. The latest and most destructive dreadnaught costs in the neighborhood of one thousand times that amount. We are told that the battleship is, in the last analysis, a saver of life and property. The interesting question arises whether or not more life and property would be saved if the same amount of money were invested in equipment to accomplish it directly.



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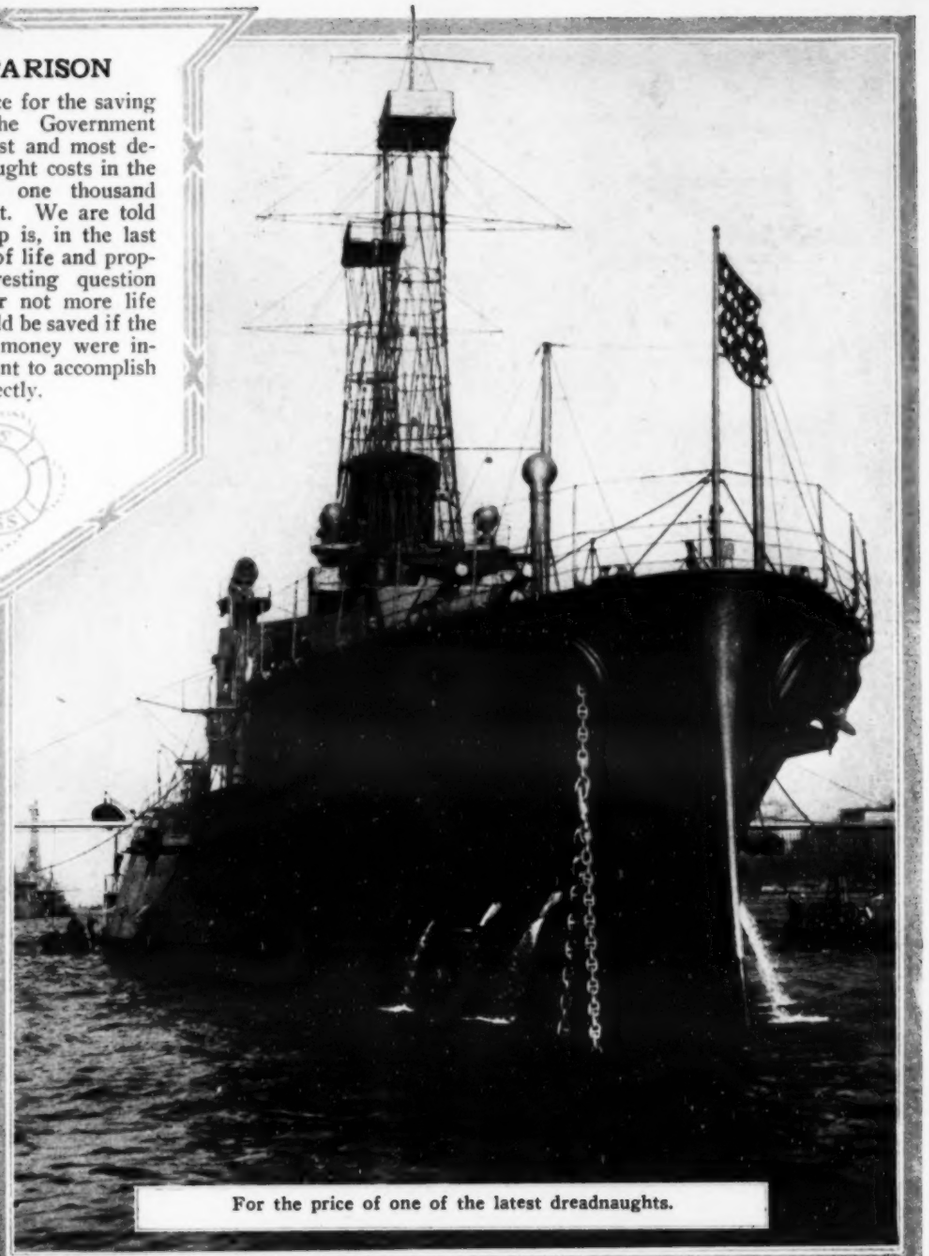

For the price of one of the latest dreadnaughts.

Photographs by Levick.

MOTOR BOATING

THE NATIONAL MAGAZINE OF MOTOR BOATING

Advantages of the Multiplane.

Some Interesting and Important Phases of the Question Discussed by the Inventor of the Pioneer of Successful Gliders. The Fourth of a Series of Articles on the Hydroplane.

By W. H. Fauber.

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The bow of a Fauber Hydro.

WHEN one has staked several years' hard work and much money toward the creation and development of a new thing, there is some satisfaction in realizing that the naval architect admits a place for the hydroplane.

These "gentlemen from Missouri" have to be "shown," but the result of this year's racing ought to convince even that naval architect from Philadelphia who got up in a meeting of the Motor Boat Club's Association, held early in the year at New York, and advocated putting restrictions on the "freak boats."

It is admitted that the hydroplane is the boat for racing purposes, but the naval architect seems to be just as persistent in discouraging the *second step* as he was the first. It must be demonstrated now that hydroplane principles are applicable to larger craft and that they are also superior sea boats.

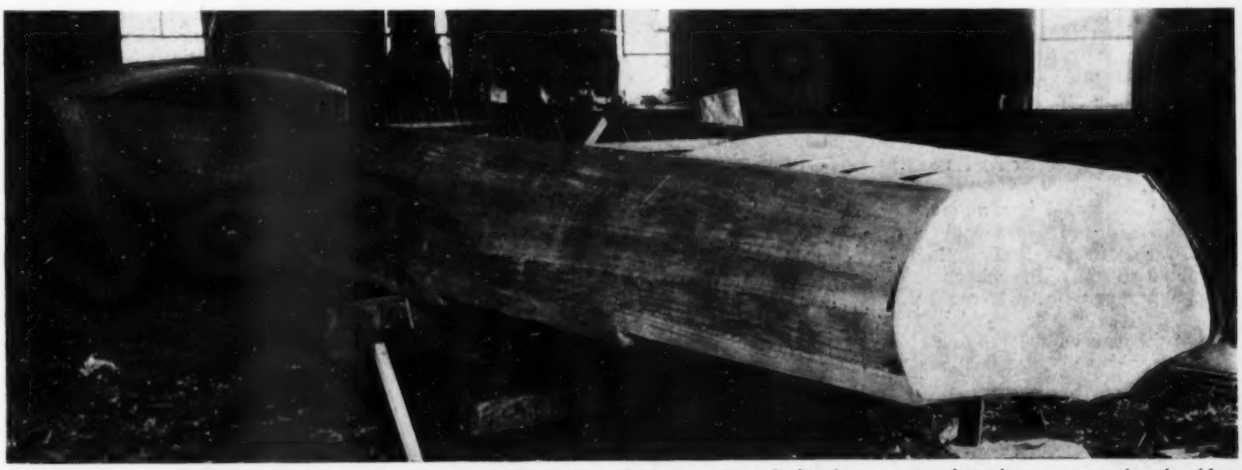
Some months ago on a train from Chicago to New York, I met a prominent lawyer and man of affairs, who argued that progress in the mechanical arts and sciences was at its zenith—and I belittled myself in this gentleman's estimation by taking the contrary view that the opportunities, demands and facilities were increasing every year and that the sum of each successive year's progress, if it could be measured, would undoubtedly be greater than that of the preceding year. This man's attitude is characteristic of men and even professional men in their own lines who are by nature not originators and not optimistic. They regard that that is, as perfected, and what is not as impossible.

Certainly, "no one man knows all about anything," but when a man specializes and produces practical results on original lines, his opinions are likely to be more correct than those who follow the blazed way.

The application of hydroplane principles to larger boats does not depend entirely on the perfection of the hydroplane itself. There is just as much room for improvement in the motive power of high speed craft as there is in the hulls and methods of propelling them.

The application of the internal combustion engine to ships is only the beginning of improvement in power equipment. The weight of the present steam-power plant per horsepower is about ten times that of the internal combustion engine. The operation of turbines by coal-fed boilers will undoubtedly be improved upon. Again, the fallacy prevails that the two-cycle explosive engine cannot be successfully built except in small powers.

The demand for high-power motors of minimum weight and fuel expense for hydroplanes, aeroplanes and other uses where



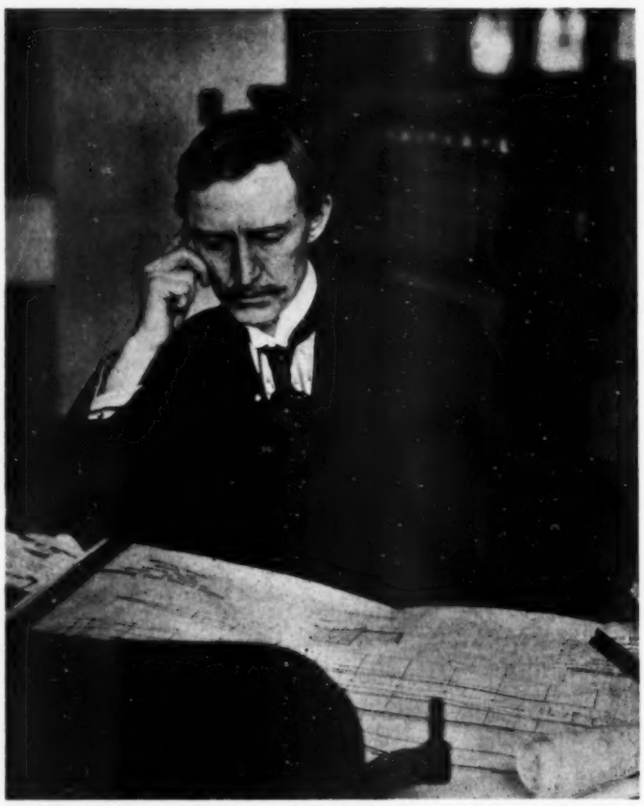
Red Top III is a representative Fauber hydroplane and the interesting view taken during her construction gives a comprehensive idea of the shape of the under-body of this type. The angularity of the V-sections becomes more acute toward the bow, and the height of the steps is less at the center line than at the sides.

speed is desirable, as well as various types of craft for navy use, will prove a stimulus that will result in extraordinary progress in these lines the next few years.

When I occasionally hear the statements and prophesy of some naval architect, limiting the usefulness and field of the hydroplane simply to the present-day performance, which he is forced by actual demonstration to admit, I feel that such men's foresight and reasoning are based largely on their own ability. They are assuming that all discoveries have been made and that the rules and theories ground into them are the "last word."

It is not my purpose to condemn the institution of naval architects, but only to correct certain tendencies of some men in the profession.

The "modern hydroplane" does not owe its existence in any respect to the naval architect, but on the contrary, from the first conception of hydroplane principles the influence of the architect has been frequently to retard rather than advance the work.



Mr. W. H. Fauber, inventor of the hydroplane that bears his name.

I am not attacking, but have taken up this subject in self-defense and in defense of the hydroplane and the interests of the sport and trade, and while dealing with the subject wish to touch briefly on another important point, viz.: the question of classification of racing boats.

The boat builder, engine builder and the clubs are not making the best of their opportunities, first, because there is not the proper standardization of racing boats, and, second, because there it not a national organization of the clubs and a national organization of boat, engine and accessory builders actively pushing the racing sport.

Doubtless if such a movement were started, certain persons would get together and frame up a complicated set of rules, as in the case of displacement boats, telling you the length, beam, freeboard weight, etc.—in fact, just how to build a hydroplane racing boat, with the result that it is a question of building a freak *rule beater*, rather than working in a direction to make the greatest progress.

Do you realize the present predicament of the engine builder and also the man who desires a boat? Men write me they want to build a 20 ft. or 26 ft. racer, but they do not know what size engine to put in the boat. One prominent engine manufacturer writes that they would like to build racing engines, but they do not know what size to build. Neither do I, nor does anyone else.

What is wanted is a *national standard* of engine for boats that would correspond with the 20 ft. class and another for boats of about 30 ft. With such standards fixed, the engine manufacturer could proceed to build engines and he would be sure to find sale for them, because the man who wants to build a boat would know what to buy. For these two standards, I advocate *no limitation whatever on sizes or construction of hulls.*

For the 40 ft. class, no limitations on power, but simply the length of the hull.

HYDROPLANE THEORIES.

In October MoToR BoatinG under the heading of "Hydroplanes vs. Displacement Boats" appear a number of statements relative to hydroplane theories and history by Mr. Henry J. Gielow, which I consider most timely topics for discussion, since it is to the reader's interest to get at the bottom of things.

Mr. Gielow says, "given two hydroplanes of similar design, but different dimensions, their weights will be as the cubes and the areas available to plane on as the squares of their respective lengths."

The substance of his argument following is that the supporting power of the planes does not increase in proportion to the size of the boat, but directly as the area of the planes.

I believe Mr. Gielow is wrong, and will give various reasons. Even a swiftly moving plane is supported partially by the displacement of a body of water beneath, and this volume of water so displaced has not only a length and breadth equal to the surface of the plane, but it necessarily has a third dimension, viz., depth; therefore the lifting power of a plane would be in proportion to the body of water it displaces and the area of the plane is not as Mr. Gielow asserts—the sole factor that must be taken into consideration.

Again, no one will doubt but what a hydroplane boat of large size would float. Now the planing action commences when the speed is sufficient to permit the air to enter behind the steps and beneath the planes.

For example, with a boat drawing one foot of water, air would enter beneath the planes at a speed of 6 miles per hour. If a boat drew 5 feet of water, air would enter beneath the planes at a speed of 12 miles per hour.

To the best of my knowledge I am the first to have discovered the rule for ascertaining the speeds at which air will enter beneath hydroplanes. I published the same in the English Motor Boat about two years ago and I have never heard it disputed.

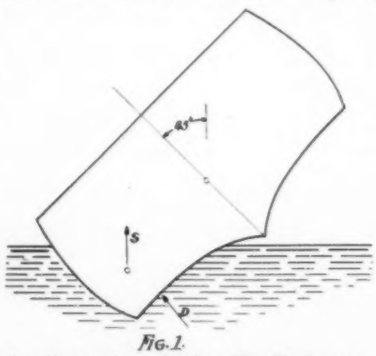


FIG. 1.

An illustration of what Mr. Fauber appropriately calls the "dynamic stability" of the hydroplane. When at speed, the same force (D) that causes the boat to plane when on an even keel tends to right it when heeled.

The point I make in this respect is that "planing" is not limited to small boats, and I am confident the next three years or so will bring forth such improvements in the internal combustion, and engines of kindred type, that the hydroplane boat will be generally adopted for navy use. My convictions are not based on hopes, but on the possibilities of development which I see can be made in hydroplane hulls, methods of propulsion and engines as well.

To satisfy myself on the very question Mr. Gielow raises, I once made the following experiment:

Take two plates of steel, each 1/16 inch thick; the small plate 1 ft. square, the large plate 2 ft. square, and containing four times the area of the small plate. Bore a ½-inch hole in the center of each plate so that they will slide down a vertical rod freely, the plates being held in a horizontal position by suitable guides.

Now holding the two plates on the surface of the water and releasing them both at the same instant, the smaller plate will go to the bottom much quicker than the larger one.

The weight per square foot is exactly the same, but the resistance of the larger plate per square foot is much the greater.

The action of large and small planes is in the same relation.

If there is doubt about Prof. Newcomb's attempt to forecast

the limiting size of the aeroplane, because of its present experimental stage and the limited knowledge relating thereto, how can Mr. Crane, as in his article in November MoToR BoatinG fix the limit of the hydroplane at about 75 feet.

I admit that it is not feasible to build a hydroplane torpedo boat or destroyer on the same lines as a 40 ft. hydroplane, but neither is a 40 ft. displacement racer on the same lines as the destroyer.

Mr. Gielow seems to think that in the aeroplane, the operation of the square cube law, as he calls it, can be overcome by superimposed surfaces, as in the Bell tetrahedral construction.

On this theory, why would it not be a good idea to divide up the main sail of a 90 ft. racing yacht into numerous smaller sails?

LATERAL STABILITY.

Want of *lateral stability* in the hydroplane is one of Mr. Gielow's criticisms.

Now, every man who has operated a hydroplane knows that hydroplanes have much more stability than displacement boats of the same beam.

The reason for this is that the hydroplane has a *new element of stability not found in the displacement boat.* I never heard a name for it, but in previous writings called it *dynamic stability,* which I think is most appropriate. Displacement boats depend solely on static stability, the shape of the bottom ordinarily being such that any dynamic action due to high speed would decrease the stability. Static stability is a *vertical force.*

Dynamic stability in the case of a Fauber type hydroplane is not always vertical, but exerts its force in a direction at right angles to the planes.

Fig. 1 represents a section of a Fauber type hydroplane inclined to an angle of 45 degrees.

Assuming the boat to be at rest in this position, there would be no element of dynamic stability, but static force only as indicated by arrow S. At speed the action of the planes on the water creates a force which is in the direction of the arrow D, and operates to restore the boat to its normal position and at high speed the action of dynamic stability is much quicker than the static element.

THE HYDROPLANE AS A SEA BOAT.

The criticisms of Mr. Gielow in this direction are not well supported by experience or by comparison of the hydroplane with the ordinary hull, at like speeds. If an ocean greyhound were to be driven through waves as high as her bow at the speed of a modern hydroplane, she would also do considerable "pitching and pounding." A three-foot wave is not considered much of a sea, but it is as high as the bow of a racing boat, and if the ocean liner were forced into waves proportionately as high and at a speed in proportion to her size she would break in two. It is not fair, on the other hand, to assume that the hydroplane, in its present infancy, is a perfected boat.

Bearing on this question, I wish to point out that in the hydroplane racer it is difficult to install the present engines with their clutches and reverse gears far enough astern to permit of the hull being designed with such lines forward as to give the best results as a sea boat, but these are constructional difficulties that will be gradually eradicated.

In considering the question of the seaworthiness of a hull that is to be driven at high speeds through rough water, the hydroplane, and particularly the multiplane type, has a feature of advantage over the displacement hull. Whether or not my arguments on this question are new, they are at least original with me. For example, driving a boat at extreme high speed, into waves the height of the bow, the forces of buoyancy and dynamic action would operate to lift the bow quickly, and with such rapidity that the water beneath the forward portion of the hull, being influenced by gravity and unfavorable currents, would not follow immediately the upward motion of the bottom of the boat. There would result at this instant a suction, similar to the vacuum produced by lifting an inverted bucket from the water.

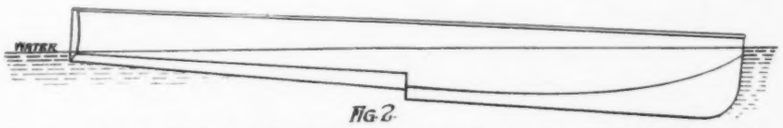


FIG. 2.

An example of a biplane diving caused by atmospheric pressure which Mr. Fauber claims is practically impossible with a multiplane in which air is admitted behind each step.

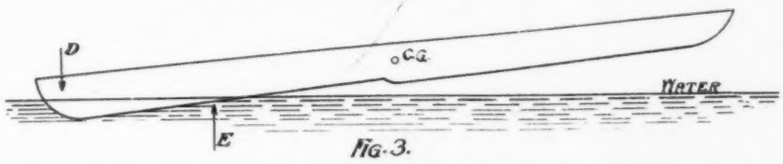


FIG. 3.

In Dr. Ramus' model the after ends of the planes were rounded, tending to draw the water up around them. The arrow D represents the force of atmospheric pressure caused by this condition.

Now, since atmospheric pressure is over a ton per square foot, it is possible that momentarily there may be an enormous force tending to break the vessel in two. Certainly under such conditions the hull would quiver and the bow would rise laboriously.

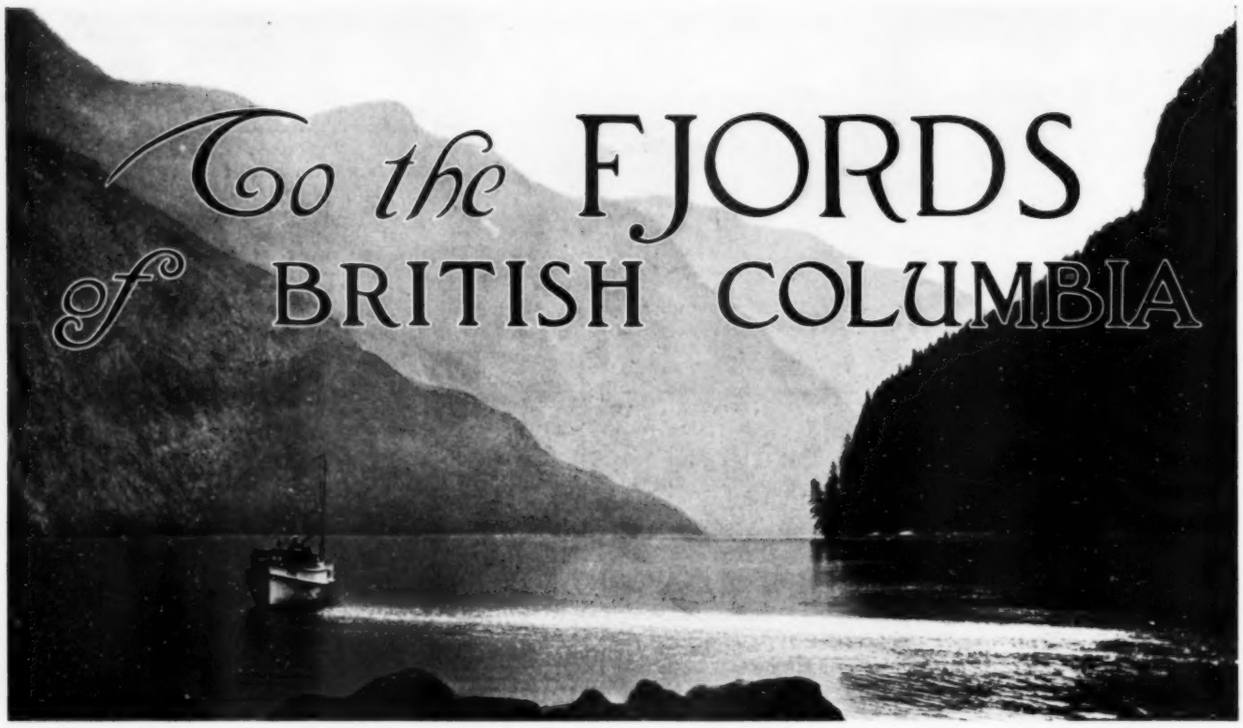
As an illustration of this condition see drawing marked Fig. 2 above.

In the hydroplane of multiplane type, the access of air beneath the planes would relieve the hull of the stress of atmospheric pressure under such conditions.

Applying hydroplane principles to torpedo boats and destroyers, there is no reason why the lines forward cannot be just as fine as in the displacement hulls. As for strength, the concave form of planes is splendidly adapted to metal construction, and there would be no "flat surfaces," as Mr. Gielow says.

(*Continued on page* 50.)

The Fauber hydroplane, Disturber II, was one of the season's most successful boats. She is a 32-footer powered with two six-cylinder Sterling motors aggregating 260 horsepower and carried off first honors at the Dubuque Regatta.



The Story of a Motor Boat Cruise to the Wonderland of the Northwest.

By Herbert G. Ihrig.

TO all Northwest yachtsmen the "Northern Cruise" represents an ideal, fixed and unchangeable, yet so varied, so extensive in its scope that it is never gained in its entirety. No matter how often he may cruise, how long he may stay, he must leave unexplored fields that hold for him charms unseen and beauties that continue to lure him northward. It was this ideal that prompted the construction of the Joean'i II and later sent her on her first northern cruise to Jervis Inlet, one of the most attractive of the hundreds that indent the west coast from Cape Flattery north.

Contrary to the usual custom, the trip was made in June, for we preferred our first cruise to be more for scenery than for fishing and hunting and chose this time as we were less liable to encounter the smoke and haze that usually appear in the later months.

Accordingly the Joean'i II, although incomplete in many of her fittings, put out of Seattle on a Thursday early in June about 10 A. M. We headed directly up Admiralty Inlet for the Straits of Juan de Fuca content to forego local points of interest in our anxiety to get into new waters, for we were now on our way north. Even the much-favored inside passage had no charm for us. But we were fighting an adverse tide and it was nearly four o'clock before we passed Port Townsend and started across the straits.

Choosing a course to the east of Smith Island Light we made excellent time, for there was no tide to buck now and just enough wind to make things comfortable. After passing Smith Island, however, the wind rose very rapidly and we were confronted with as nasty a stretch of water as one could encounter. Our course lay directly in the trough of the sea, but we held it until a giant comber rolled us over at a threatening angle, carrying overboard our forward anchor, which had been carelessly left untied, and teaching us some things entirely new about stowing away provisions such as sugar, catsup, etc. For the next two hours we battled with a forty-mile gale, trying to make our destination, first by heading into the sea for a leg, then running from it. It was a battle of endurance, and slow work at best, but every inch of the 45 feet that the Joean'i II lays claim to was built to withstand just such a sea, and she finally entered Middle Channel like a bulldog that had shaken off the attack of a greater enemy, decks washed and dripping, but ready for another encounter. We had been just two hours and thirteen minutes covering a course of eleven miles from Minor Island Light to Cattle Point.

Darkness was now fast gathering, and we ran into Upright Channel and anchored behind Canoe Island. This spot affords a splendid anchorage and is protected from even the slightest breeze, but great care should be taken in making soundings, as a large patch of rock bares itself at low tide directly opposite the northern point of the island.

Everybody was so thoroughly tired from our experience that we lacked ambition to make an early start the following day as intended, and it was after eleven o'clock when we ran into Friday Harbor. Here we replenished our water supply, then headed through the Wasp Islands for Deer Harbor, where we purchased fresh meat and berries. I cannot pass this spot without a word of mention, for in all your travels you will not find a more beautiful place than this little bay. From here the miniature islands of the Wasp Group studding the San Juan Channel on the outer harbor line form a picture that will linger in your memory many days.

It was late in the afternoon when we reluctantly gave up these surroundings and headed across Haro Straits into Swansen Channel. We had now passed the international boundary line and were in Canadian waters. Strange what a feeling of pride this gives a navigator the first time. To be in foreign waters, to scan the horizon of unknown seas, to chart one's course by the setting sun—this is to feel the lure of the wild, the wanderlust that has shaped the destinies of men and empires.

Following Swansen Channel we put into Village Bay on the southwestern shore of Mayne Island, just south of Active Pass, and anchored in ten fathoms sandy bottom. Morning found us on our way by seven o'clock, for being Saturday we must be in Vancouver before one to get into the customs office. Passing through Active Pass we left the buoy off Gossip Island at 7.48 for a direct run of thirty miles across the Gulf of Georgia.

The atmosphere was hazy, and we could see no prominent headlands, so set our course NW by N½N to overcome an incoming tide that sets east, then after passing Frazer River lightship, N by W¾W to the outer buoy of Burrard Inlet, making Vancouver at a little after twelve. But alas! by the time we found the Customs Office it was closed, and we faced the possibility of waiting over until Monday. By a rare streak of good luck, however, we succeeded in locating Mr. Bowell, the collector of customs, who kindly consented to issue our cruising permit.

Mr. Bowell is the type of official it is a pleasure to meet, and it is to be regretted that American boats are not more careful in complying with the regulations he outlines.

After buying a new anchor to substitute the one we had lost we were again on our way, passing Brockton Point at 4.40 P. M.

Here in the narrows we struck a heavy incoming tide and, not knowing the channel sufficiently well to take advantage of the eddy, bucked the full stream for thirty minutes to make Prospect Point, a distance of a mile and a half.

Outside the narrows we passed the Empress of Japan, one of the Canadian Pacific's Oriental liners, on her way in from Hong Kong. Soon afterwards we left Point Atkinson in our rear and turned into Howe Sound through Collingwood Channel.

Vancouver, the first white man to enter this inlet, one hundred and twelve years ago, described it as "A place occupied by the base of a stupendous snowy barrier, thinly wooded, and rising from the sea abruptly to the clouds; from whose frigid summits the dissolving snow in foaming torrents rushed down the sides and chasms of its rugged surface, exhibiting altogether a sublime spectacle. * * * Not a bird nor a living creature was to be seen, and the roaring of the falling cataracts in every direction precluded their being heard had any been in our neighborhood." This description applies in every way to-day as well as then with the exception of a few houses that dot the shore line.

It was about an hour before sunset when we headed up the channel and the lengthening shadows were fast filling the lower mountain ravines with a purple haze. Above, lofty summits thrust their fangs into a golden glare, the water below reflecting with intensifying beauty the myriad hues of sky and mountain. It was a picture from fairyland, one that baffled description yet fixed itself indelibly upon our minds.

Many American boats do not make this trip, thinking probably that its nearness to Vancouver robs it of its charm, but no greater mistake could be made than to miss this section. Personally we would have considered ourselves well repaid for our trip if we had been unable to go farther—a possibility that assumed alarming proportions the following two days.

We rounded Keats Island and put into Plumper Cove, an ideal anchorage well protected from the heavy gulf swells by two small islands. We got our hook into bottom at eight fathoms and prepared to spend a quiet evening. But vain hope! As we stopped our engine we noticed that it was smoking considerably, and upon closer examination found that the entire frame was exceedingly hot.

"We ran in close to one of the falls and were able by means of a hose and funnel to fill our water tanks directly from one of its many branches."

Realizing that there was a shortage in our oil supply, we opened up our lubricators and endeavored to start again to run her cool, but "nothing doing." After cranking and recranking, overhauling our sparking system, we concluded our trouble was in the compression, and determined to wait until morning before tearing down. Sunday, bright and early, we were at work. We knew where our trouble lay, but lacked experience in getting at it. We took off our cylinder heads, unbolted our crank-bearings and began a laborious process of raising our piston heads out by means of a pry, blocking inch by inch until we could get hold on top and pull them out, bruising, mashing fingers, for a 7¼ x 9 piston head in a heavy-duty engine is no plaything. Imagine our disgust when later we saw an experienced man lift them out by means of a machine thread in the top in less time than it takes to tell it. But that is to be classed with knowledge, the first with experience.

The all-important thing was that we succeeded in getting them out, and spent the rest of the day in cleaning cylinder rings, tightening or slackening bearings and overhauling everything in general. Proud of our accomplishment and assuring the ladies that everything would be all right now, we put things together in hopes of hearing that beloved chug-chug again. But our hopes and our reputations suffered a severe shock when we cranked and cranked and still could hear our compression escape through the cylinder rings.

Our engineering ability, limited to a marked degree, was now exhausted, and when a steam tug put in the cove for the night we gladly parted with a hard-earned "twenty" to be towed back to Vancouver.

Have you ever been towed home? If you have you can appreciate our humiliation, but, great as it was, it was not equal to our disgust when a mechanic repeated our operations on

the cylinders, poured a generous supply of oil into our rings and had her running like a watch in less than thirty minutes. The oil had turned the trick.

I did not think so then, but now I believe it was worth the price to find out how easy it is to do a thing when you know how. After our bungling efforts that little red-headed Scotchman sure was some man.

We did not attempt to start again that day, but tied up to the Canadian Pacific dock for the night, some of our party going up to the city, the remaining ones canoeing in the harbor.

Morning saw us pass Point Atkinson again, but our lubrication troubles were not over. The center bearing was continually heating, and we were obliged to make frequent stops to oil it. Having a long stretch ahead of us, we did not wish to risk it, so again turned into Howe Sound and tied up at Snug Cove. Here we overhauled our lubricator, to find that a valve was stopped up with brass filings that had never been removed at the factory. This consumed several hours, but we made a thorough job of it, cleaning all our feed pipes at the same time. It was after four o'clock before we were under way again.

From Point Roger Curtis our course lay W. ¼ S. for twenty-one miles to Merry Island light. This was a bleak, uninteresting run, but after we had passed the lighthouse, which sets picturesquely on the side of the island, and entered Welcome Pass we were treated with some excellent scenery, increasing in beauty as we continued, and when we rounded the outer buoy of Buccaneer Bay viewed one of those glorious sunsets that will always be the chief enchantment of the ocean.

Buccaneer Bay is formed by an opening between East and West Thormanby Islands at about 30° N., 124° W., and affords splendid anchorage near the head of the bay. A long sand flat extends along the west shore, however, and it is preferable to anchor well out, as the range of tide is often deceiving. In entering the bay, pass well outside the buoy which lies about three-quarters of a mile off the northern point of East Thormanby Island, as a nasty reef extends almost to it.

Buccaneer Bay left several distinct impressions with us. It was the first stop where we were absolutely carefree, for this night we had no lost anchors or stubborn engines to think about, and so brought out the phonograph. We had gained the impression in entering this bay that it was deserted, as there was only one house to be seen and no one around. But with our first selection (from the "Pink Lady") we received a response in several directions by the howling of dogs. It remained, however, for our next piece—"Every Little Movement"—to bring out the full quota of sufferers, for apparently in every direction they set up a wail that must have been exceedingly distressing to those nearby. But we did not prolong this agony, for our second impression came upon us quite as unexpectedly as the first. From an almost cloudless sky came a sudden gust of wind to ruffle the smooth surface of the water, then another and another, following in rapid succession. The boat swung restlessly from her cable shifting with each change. Across West Thormanby Island we could hear the surf, faintly at first, but increasing to a steady roar. We seemed scarcely to have time to fasten our hatches and give the anchor a little more cable when the sky darkened and the fury of the storm struck us. But we were content, for there is more good sleep in a heavy storm anchor than many people realize.

By morning the storm had spent itself, and we headed NW ½ W for Pearson Island and entered Agamannon Channel, the southern passage to Jarvis Inlet proper.

Since leading Howe Sound we had passed a comparatively low country, now we again caught sight of the mountains rising beyond Prince of Wales Reach, some twenty miles distant. It seemed hardly possible that we could follow this tortuous channel so far, yes, skirt the very base of these mountains and penetrate regions far beyond. But ten o'clock brought us to Vancouver Bay at the foot of Marlborough Heights, which towered thousands of feet above us. We dropped anchor at the mouth of a stream.

Anchorage here, as elsewhere in these waters, is a difficult problem, for the ground drops off abruptly like the mountains that rise from the water's edge. One hundred fathoms and no bottom is the universal sounding here, even directly along side the shore. On the other hand, at the mouth of every stream there are large flats of silt, carried down by the water, but these invariably bare at low tide, and their edge drops off almost as rapidly as elsewhere.

The only practical way we found was to put our nose over the edge of the flat and drop a forward anchor, then back out into deep water and put down a stern one. This prevented us from drifting either out or in, but one needs plenty of stern line, for in this instance our forward anchor dropped into two fathoms, while our stern one went down over thirty. And, believe me, this is "some heave" when you go to pull in.

We went ashore here and spent the day exploring the old skid road that leads up the mountain and in fishing the stream.

The next day we followed Princess Royal and Queens Reach between rows of jagged peaks that rise six, seven and eight thousand feet from the water. Our destination was Princess Louise Inlet, and we directed our course accordingly, but our pilot book here gave us some little annoyance. It read as follows: "Princess Louise Inlet, on the east side of Jarvis Inlet five miles below the head, is narrow, and about four miles long in a N. E. direction; it is connected with the main inlet by a narrow gorge, which at low tide becomes almost a waterfall, rendering it impossible for boats to enter except at high water."

We made a hurried search for the tide table, to find that there would be no high tide until around midnight. Besides the moon was having one of those off weeks just then and was giving us only one tide a day. Entry at midnight was quite impossible, so we continued our course, determined to take a look at the channel anyway. As we approached the narrows the tide was still running out at a fair rate of speed, but did not look threatening, so we picked out a course and decided to attempt it. The entrance, exceedingly narrow at best, is choked with one small island and innumerable outlying rocks that make it almost impassable. I had been told that one could enter on either side of this island, but would hate to recommend the south side. We chose the northern channel and got through very successfully.

Contrary to the pilot book, I would advise one making this trip for the first time to enter at low tide, if possible, as many rocks are uncovered then that could not be seen at higher water.

Although not completely finished at the time of the cruise, Joean'i II proved a very comfortable and thoroughly capable 45-footer for northern cruising.

Any description of the next few miles to the head of this wonderful waterway could not begin to do it justice. It was a series of surprises, of pictures that revealed themselves at every turn, each of increasing beauty and grandeur, culminating at the head in one of the wildest and most rugged landscapes one could wish to view. Mountains, gigantic, awe-inspiring, thrusting their summits into the sky; massive boulders whose perpendicular walls rose from the sea; waterfalls, myriads of them, from the size of silken floss threading their way down the rocks, to tremendous cataracts that come crashing down from the glaciers

above, all to lose themselves in the silent depths below.

One is obliged to pause and wonder that a place so easily accessible, so favored by climatic conditions, so wonderful and varied in its beauty could possibly be neglected by a pleasure-loving people. Were the same stretch in Europe, it would be known the world around, and yet it would be safe to wager that scarcely fifty boats have ever entered it.

We put a line ashore at the base of the falls and got our anchor into bottom at twenty-five fathoms, then explored the indentations of the shore line. But we were unable to land, except in a few places, there being scarcely room to stand when the tide was high.

With night the mountains assumed more wonderful proportions than ever, their towering heights looming ominously above, a mass of inky blackness that shut out all but a narrow stretch of sky and threatened to obliterate us.

Morning found us ready to depart, but such a thing was quite impossible, as there was no slack water until about three in the afternoon, and we were literally prisoners until that time. The thought of being penned up in this narrow gorge, unable to land or yet to leave, with unscaled walls above and unfathomed depths below, was a novel one. But we spent out time very profitably, taking pictures, fishing and filling our water tanks. The latter was done in a rather novel manner.

Running our boat under one of the lesser falls, we tied both ends to the rocks. Then putting a funnel in one end of the hose that led to our tanks, held it against the rock to receive the water that came rushing down. It was equal in every way to the regular hydrant attachment.

Leaving the head of the inlet, we now ran down near the narrows and tied up to shore, awaiting the change of tide. The nearest correction of tide given in the tide table was Pender Harbor, some forty-five miles away, and we had to estimate the time of low water here, which we figured would be about thirty minutes later. This estimate proved too great, however, as we struck a very heavy incoming run that threatened for a few minutes, to hold us captive for another twenty-four hours.

Turning our heads toward home again, we followed out the inlet and anchored in Vanguard Bay, on the north side of Nelson Island. This island is widely known for the splendid deer hunting it affords in season, and our observation would uphold it, for as we entered the bay we were attracted by a pair of them that stood leisurely surveying us from the nearby shore.

We put in back of a small island on the northeast side of the bay and anchored in nine fathoms rocky bottom, but it seemed good to swing from a single cable again.

From here we crossed the mouth of Jarvis Inlet and stopped at Thunder Bay, where we secured bread, chicken and fresh vegetables from a farmhouse, the first we had seen since leaving Howe Sound.

Even if there were nothing wonderful along the way, the enchantment of Princess Louise Inlet would be a generous reward for those who visit her.

Passing out of Jarvis Inlet, we headed SE. to Cape Cockburn, then E. by S. ¾ S., intending to return to Vancouver, but when opposite the south end of Taxada Island decided to cross the Gulf of Georgia here and clear from Nanaimo. Accordingly we changed our course to pick up West Rocks off Vancouver Island, some twenty miles distant.

The morning was unusually clear, and after running our course a short while we were able to see what appeared to be a number of small islands quite a distance ahead of us and a little to our port. Consulting our charts, we could in no way account for them. Surely there were islands in that direction, but quite a distance away and nowhere near the number we could see. I puzzled for some time, then called the chief engineer and asked him to lay out our course, to see if it corresponded with mine. This checked up all right, and we got an additional check on our location by the bearing of Point Upwood on Taxada Island. Still we could not account for these numerous islands, but held our course, confident that we would find an explanation as we advanced.

A little later, almost as we watched them, two of the islands suddenly merged into one. The mystery was solved. We were again taught the lesson of our school days—the curvature of the earth, which permitted us to see at first sight only the highest elevations. As we passed on we could pick out small islands in many directions, first by the line of tree tops that rose apparently from the water, but, as we advanced, would grow taller and taller until the island itself could be seen.

After some little time we passed through Horswell Channel and made Nanaimo at 11:30.

Nanaimo Harbor is a nasty one for reefs and other obstructions, but is well buoyed and can be entered with comparative ease.

Leaving Nanaimo we headed down Northcumberland Channel, and before us opened out an inviting but deceptive pass called False Narrows, because of the shallow water and hidden reefs. But we still bear down upon it until Dodds Narrows open out to our starboard. This narrow passage connects Northcumberland Channel on the north with Tricomoli Channel on the south.

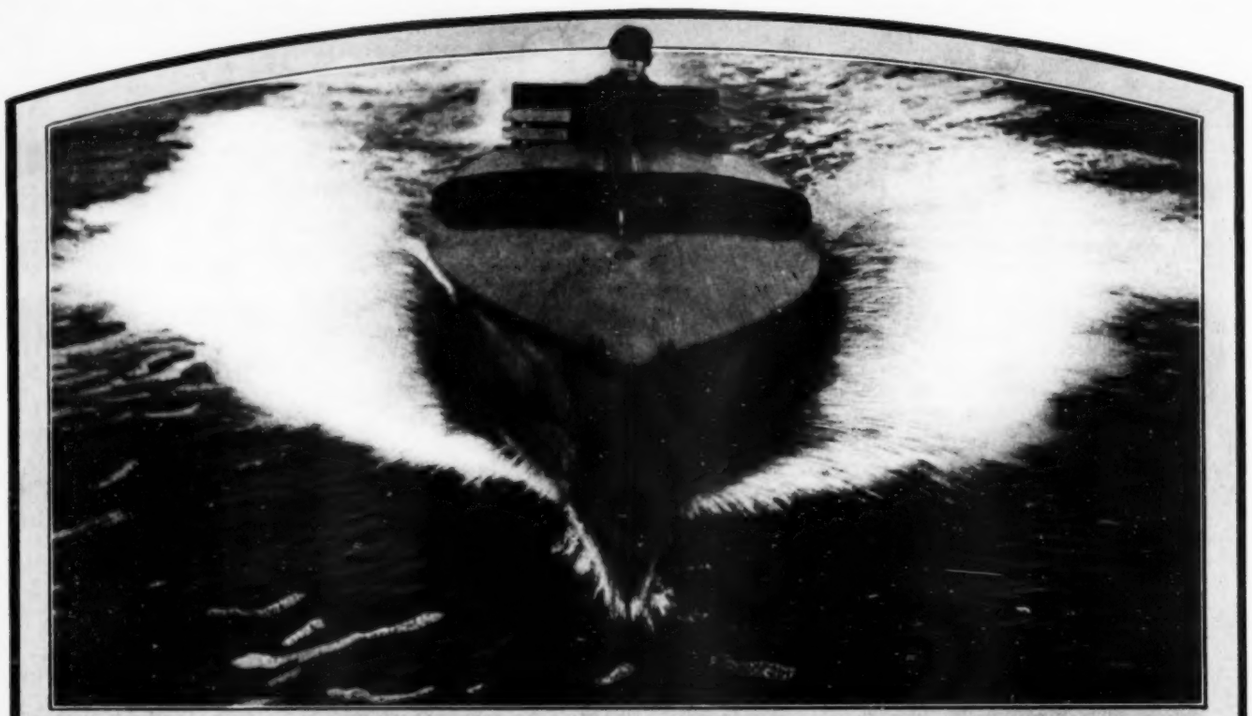
Passing on we wended our way through some small islands and headed for Yellow Point, where we turned into Stuart Channel and followed it to Maple Bay, our anchorage. Maple Bay is the watering place for a large section of Vancouver Island, known as the Cowichen district, and is only a few miles from the main line that runs from Victoria to Nanaimo. A great number of people have built summer homes here, and it is as typical an English village as one could find anywhere. Its several tea-houses were thoroughly foreign, and after dinner we paddled down to one and sat on the wide veranda, sipping tea and listening to a conversation as strange to us as though we were in England. Our boat immediately became a "yawcht," "been" was pronounced "bean," and all the other seeming peculiarities of English speech were here. Their uniform courtesy and kindness, however, was quite a pleasing change from the abrupt and business-like manner of our own countrymen.

From Maple Bay we proceeded south again through intricate channels and innumerable small islands until we reached the Straits of Haro and again crossed into American territory at Roche Harbor.

Passing out of Roche Harbor on the north, we entered successively Speiden Channel and San Juan Channel, through Deer Harbor again, Pole Pass and into Harvey Channel. Evening brought us at anchor back of a small island near Lopaz Pass, where we spent the night.

Negotiating the Straits of Rosario and Deception Pass the following day, we returned home by way of the inside passage.

As we pulled alongside the float our log showed a total of over seven hundred miles, scarcely thirty of which were retraced, yet we had hardly touched upon the possibilities of this great region, so extensive, so wonderful, that it cannot be encompassed in our allotted time of three score years and ten, but will remain always to lure us on.



HOW to BUILD a MONOPLANE

By Henry Douglas Bacon.

There is a steadily increasing demand for a small, practical hydroplane, simple in construction, yet capable of considerable speed with small power; and to meet this demand this article has been prepared. As shown in the photographs, Mr. Bacon has backed up his belief in the design by building a boat to it for his own use, and with a 22 h. p. Roberts motor a speed of about 25 miles an hour has been obtained.—Editor.

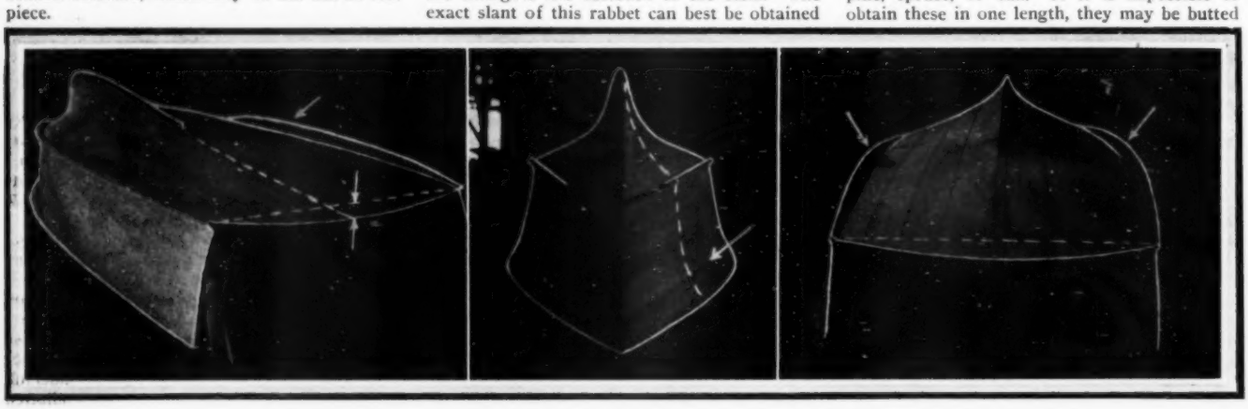
THE regular hydroplane, although possessing great speed, is nevertheless a very disagreeable proposition to ride in, and it is doubtful whether, below certain lengths, the step is of any importance. In the design of the little boat described herein, use has been made of the hydroplane principles by combining the hollow V-bow with the concave stern section. In this way a boat of maximum speed is obtained with freedom from pounding.

Two arrangements are shown: one open, with seating capacity for six or eight persons; the other, a regular auto runabout arrangement. From the figures given in the line plans, the frame should be gotten out about the form shown in the midship section, ⅝ in. thick and about 1½ in. deep, swelled out in the way of the bilge, so as to provide good fastening. The two sides should be gotten out alike and fastened together by the floor, which is also of oak ⅝ in. thick. Screws, clinched nails or rivets may be used for this purpose, the rivets, of course, being the best. There are six sets of frames, all of which are made about the same, except probably the first section forward, which may be cut out of one piece.

The next step is to get out the stem from the figures given in the line plan. This will probably have to be gotten out in two parts, as indicated by the dotted line. One of the hardest things for the amateur is the rabbeting of the stem. This is shown in the line drawing, being the line where the ends of the planking butt up against the stem. This cut should not go straight into the stem, but on a slant, so that the ends of the plank will be exactly square. The full size sketch on the midship section shows what is meant, and also how the stringers are fastened to the stem. The exact slant of this rabbet can best be obtained when the boat is framed out by running the plank along the frame and up to the rabbet line. It is then possible to see how much pairing is needed. The scarf in the stem should be about 9 in. long, and should be located so as to take the best advantage of the material at hand. This should be well fitted and fastened together by means of long rivets, riveted over burrs. Details of scarf is shown in the midship section. The stem should be sided about 1½ in. to 1¾ in. and should be of oak.

Figures for the stern board are also given in the line drawing. Oak, cypress, mahogany, or some such wood should be used, sufficient material being left at the top for the round of the backboard. The best stock for this is ¾ in., and the cleat for fastening the planking should be placed where the edge grain comes.

The keel can next be gotten out, and should be of oak, ⅞ in. x 1½ in, tapered at the after end to thickness of planking. The apron should be of oak ¾ in. x 4 in. The bevelling of this should be done when the frame is erected. The base is about 17½ ft. long. The stringers come next, all ½ in. x 1 in. yellow pine, spruce, or oak. If it is impossible to obtain these in one length, they may be butted



The under-body of the 20-foot monoplane. Note that the forward sections are of pronounced V shape and considerably flared, preventing pounding in rough water, while the after bottom is a trifle concave. The bilge fins were pared down considerably more than shown here.

between frames with pieces the same size, well screwed or riveted to each part.

With these parts in hand the boat can be set up. Care should be taken to make sure that a level place or plank is used for this purpose. The distance of each frame above the floor is given on the line drawing, and should correspond on the floor or plank. The first section, for instance, is 3¾ ft. from the floor to the deck batten; the second 4¾ ft., and so on. In setting up it is important that the center line of each section be exactly plumb. Stretch over the tops the apron connecting to the sternboard and the stem. Run a batten along the bilges on both sides, so as to see if the boat is fair ,and if not, straighten the frames out so as to make them come so.

It might be well before putting the stringers in to fit in the bilge keelson. They should be of oak, 2 in. x ¾ in. The bevelling of this may be done when in place. It should be notched into the two frames sufficient to allow a good bearing for the planking to lean on. It should be well fastened into the sternboard and also into the stem, by tapering it on the inside and notching it to the stem itself. The stringers may now be laid on the frames, and faired up. (By fairing is meant running in a true curve with no unevenness.) The stringers should be spaced about an equal distance apart and a temporary nail put in to hold them in place until faired up. When fair, mark them on the frames, and cut them in so that the outer surface is level with the frame.

The bilge keel, which is really an air plate or spray shield, should next be put in place. It should be of ¾ in. oak by 2 in. wide in the widest part of the boat, and should taper down to nothing at the bow and stern. The fastenings of these should be very carefully made, with through bolts about ¼ in. diameter, riveted up on the inside, with heads counterbored into the bilge keel, and afterwards plugged. The stringers should be notched into the stern cleat or stern board; that is, they should not be notched so that the ends will come through the stern, which would cause danger of leaking, and would look badly. Instead, have them sufficient to get a good hold and taper them on the back side before letting into the stem, so that they will not come through. The keelson can now be tapered so that the planks will lie flat along the frame. The bilge keelson, if not already so, should be tapered before the planking is started.

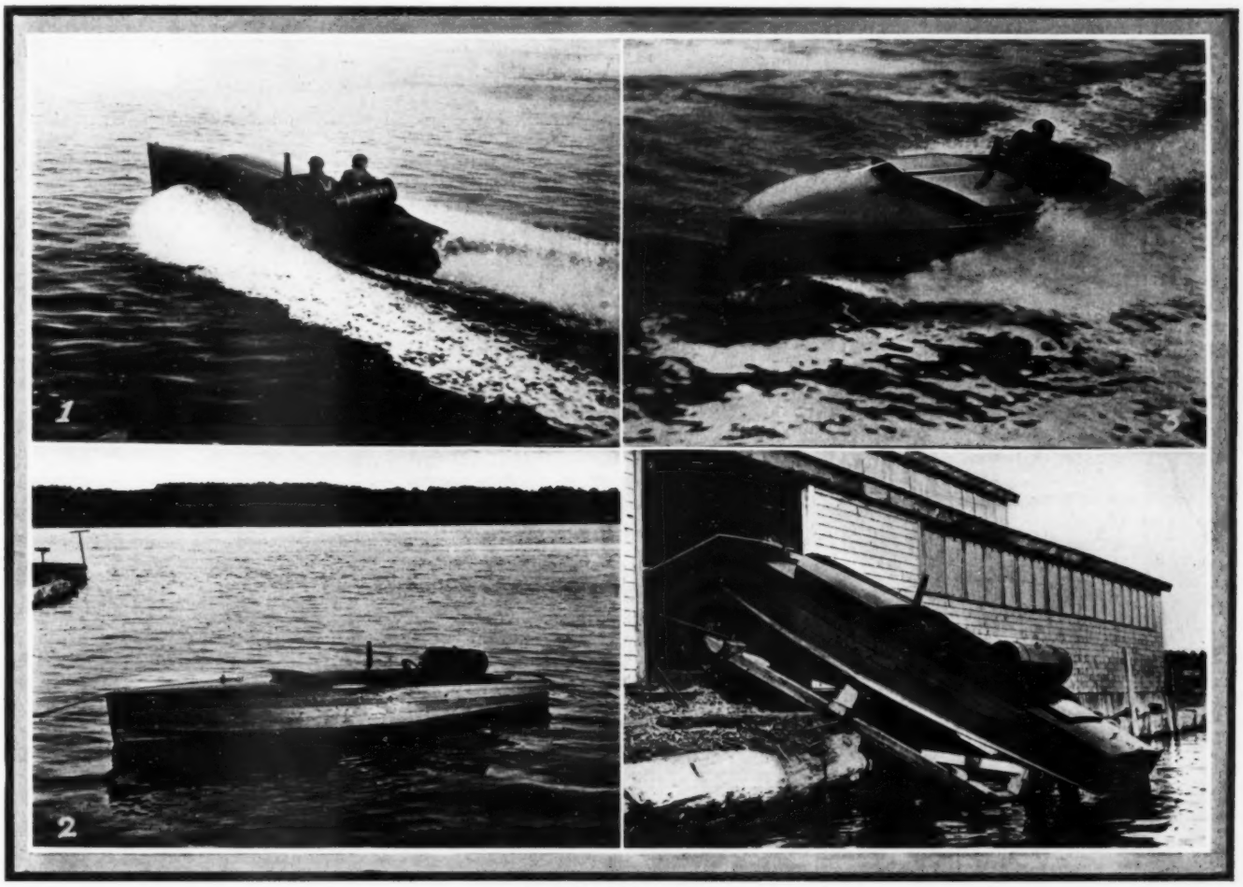
The planking of the boat should start at the garboard, as this is the hardest to get out. Take one of the planking boards, which should be 5/16 in. to 7/16 in., and tack it along the frames as close to the keel as it will come. Hold one end of a pair of dividers against the keel and run a line along this board parallel to the keel. Then trim the board to this mark and it will very nearly fit against the keel. Continue the trimming until it fits exactly. First, however, it would be well to fair the rabbet from the stem into the keel. With the garboard once well fitted, it is an easy matter to get the other edge of the plank by merely drawing a pencil along the edge of the stringer on the upper side of the plank, and then either adding or subtracting one-half the width of stringer, and a little open—about 1/16 in.—on stringer the mark was made on. The succeeding planks can be gotten over merely by laying them on the frames along the top of the stringer and then marking along the edge of the stringer on the plank. It is best to have these seams tight on the edge next to the stringer, and a little open—about 1/16 in.—on the outside, but as the stringers form a backing, this is not absolutely necessary.

Great care should be taken in fastening the planking so as not to split the plank. Along the keelson, screws may be used to good advantage. They should be spaced about 2½ in. to 3 in. apart. The best fastenings through the stringers are copper rivets, riveted over burrs or clinched nails. Some people, however, prefer screws. The spacing should be the same in either case—2½ in. to 3 in. All holes should be bored before the fastenings are put in so as not to spoil the material. If the boat is to be left open it is best to make the top or sheer strake a little thicker than the others, and run beading on the lower edge for a finish. This can be of mahogany, if desired.

The boat is practically complete when the planking is in place, the only other things of importance being the gunwale. clamp and the seat riser, the sizes of which can be obtained from the midship section. It is an easy matter to fit these, and they should be well fastened in place, with screws or rivets. The flooring should be run on top of the floor beams about the size indicated on the midship section. If the floor is only ⅜ in, the spacing should be not greater than 12 in., but if ½ in. or ⅝ in. thick, it may be as much as 18 in. If extreme lightness is desired, space may be left between the flooring boards, but this is objectionable, as things would drop into the bilge. The center-boards should be left loose, so that the bilge can be easily cleaned or painted. Large waterways should be cut at the center line, along the top of the cleats.

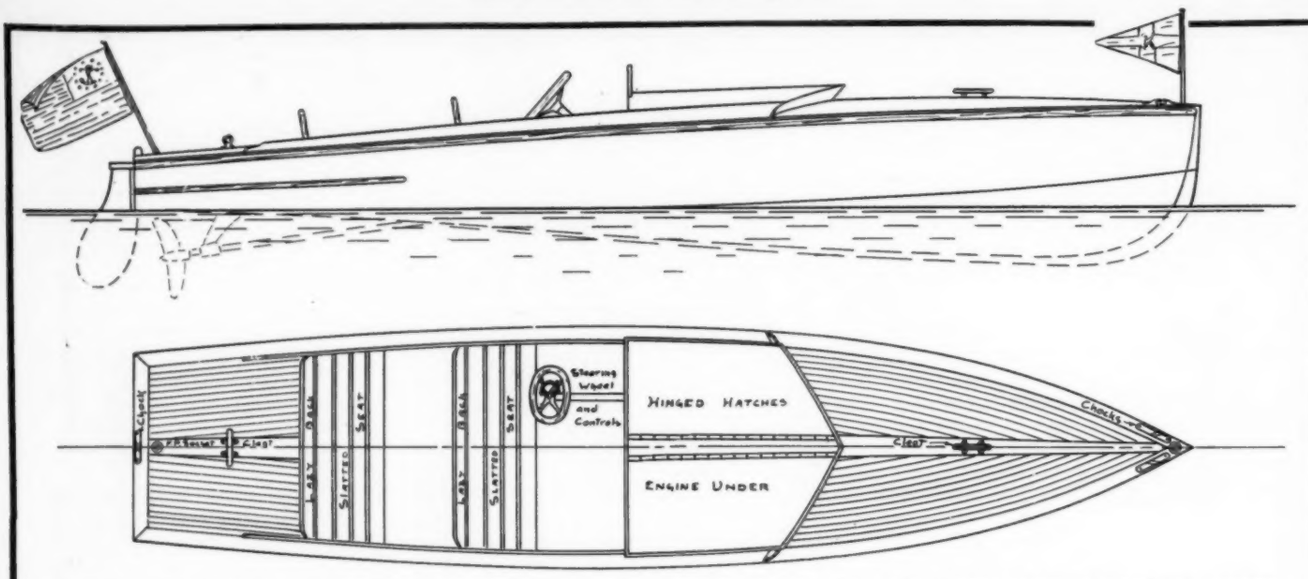
Nothing has been said about the engine foundation, because it varies with the type of engine installed. It may be well, however, to give an idea of the way this should be put in, the method being subject to modifications to suit special conditions. Usually two cross floors, set about half-way between the regular floors, are required. The forward one of these should probably be 9 in. deep, and the

(*Design on following pages, text continued on page 67.*)

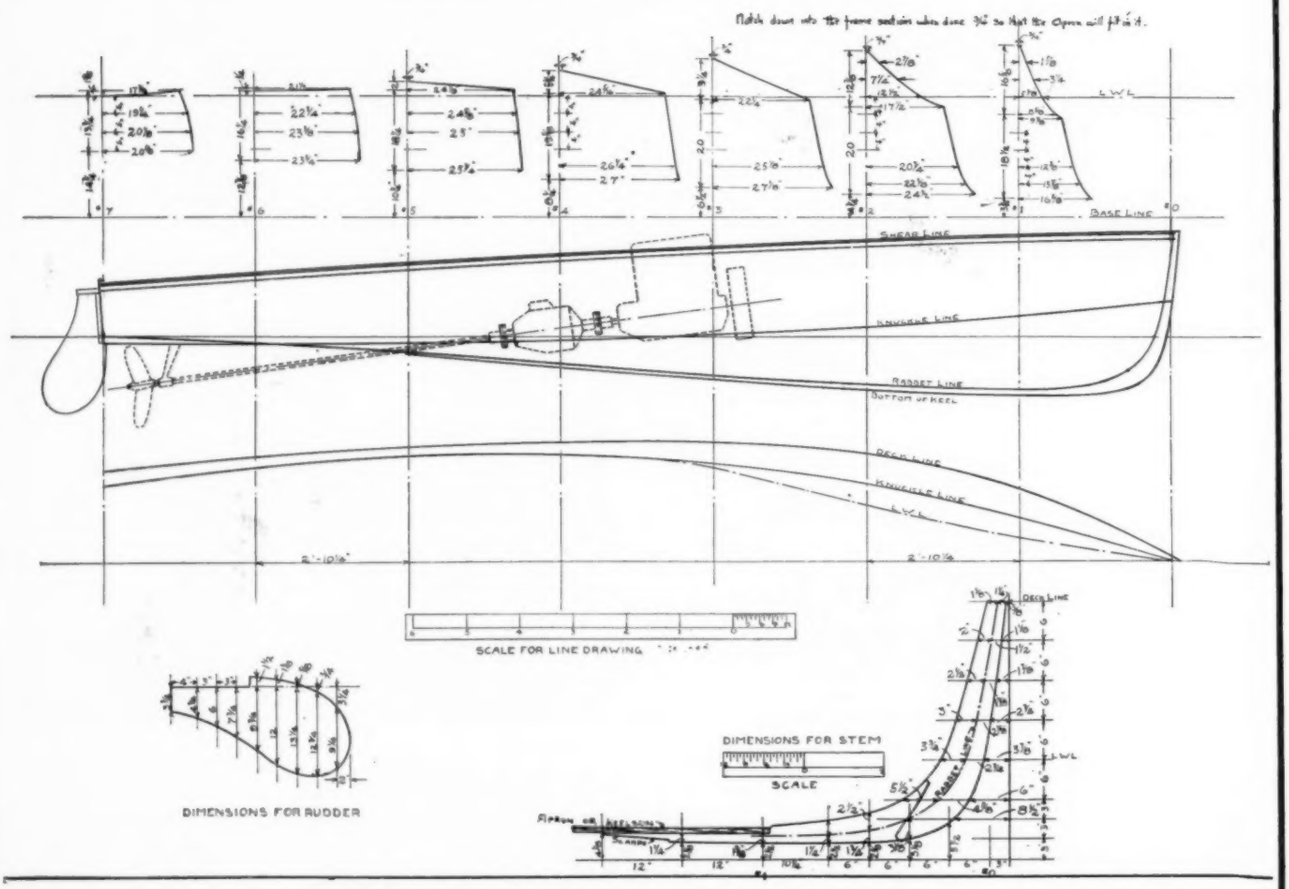


The Finished Product.

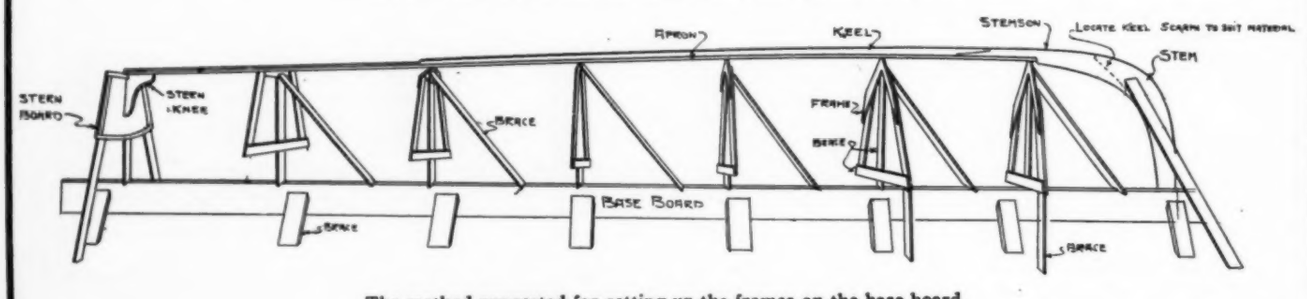
1. At 24 miles an hour the boat throws but little spray. 2. She trims nicely when at rest and presents a fine appearance. 3. In rough water she does not pound and she has proved herself as seaworthy as a displacement runabout. 4. The rudder is hung outboard with tiller projecting through the transom.



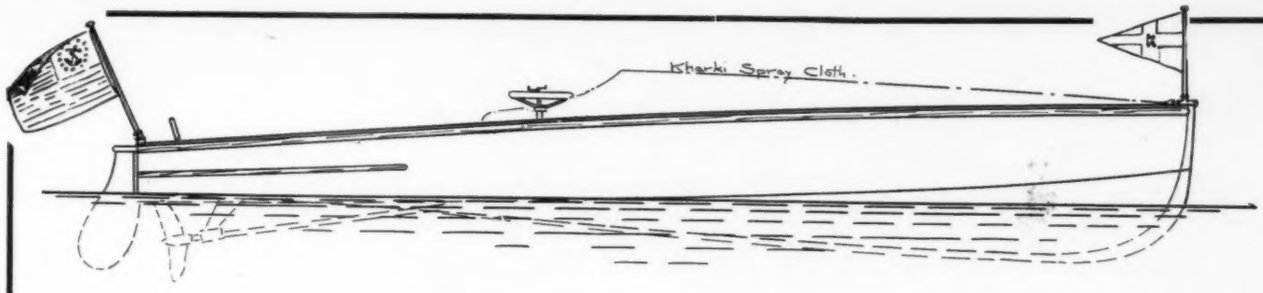
The 20-foot monoplane described by Mr. Bacon has a V-bottom forward, with the sharp bilges falling below the keel, aft, making the bottom concave in cross-section at this point.

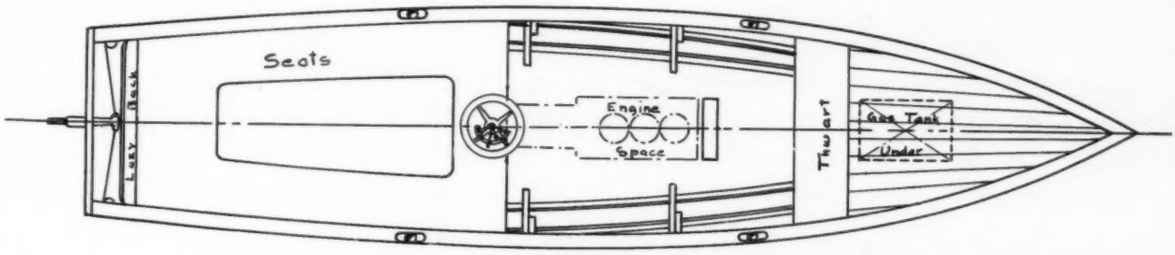


The lines and the "offets" for constructing the 20-foot monoplane.

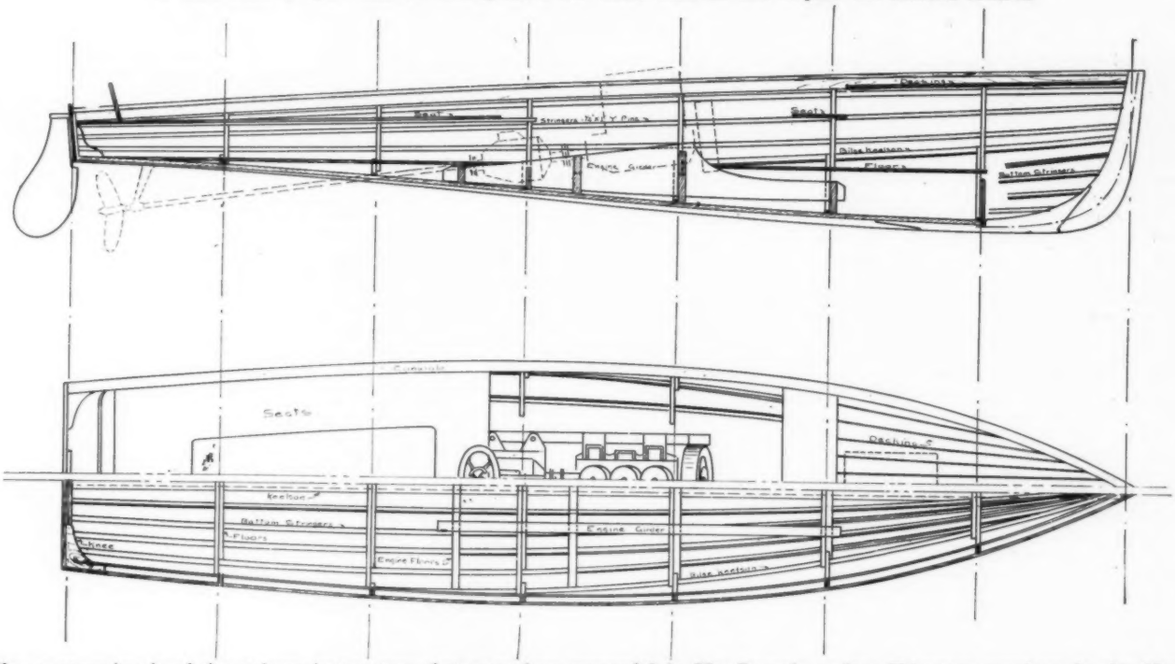


The method suggested for setting up the frames on the base board.

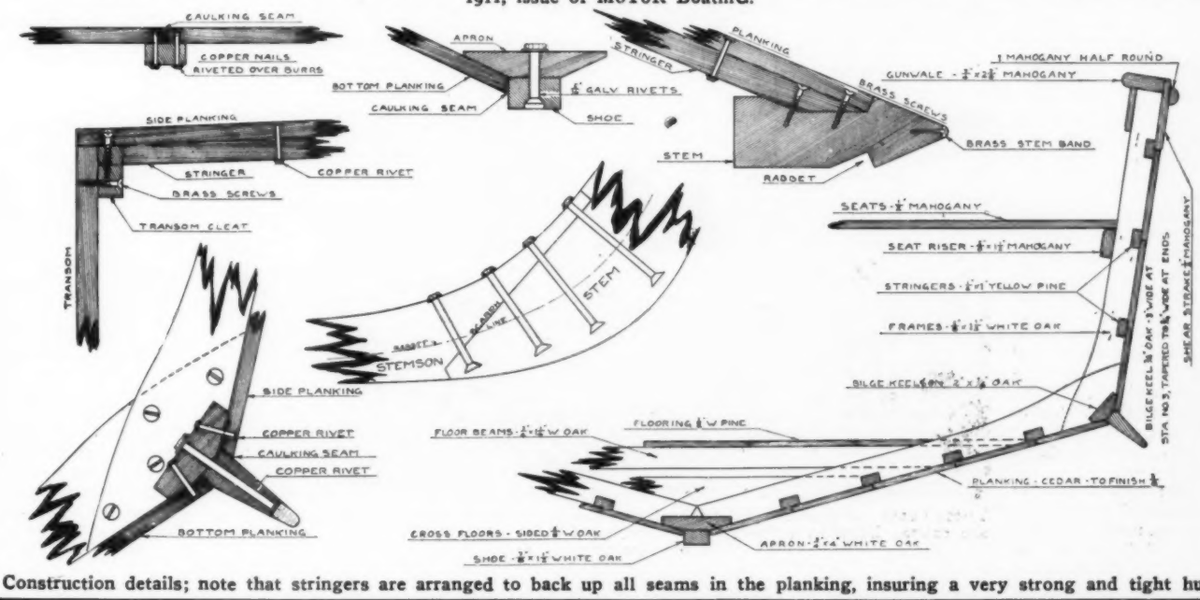




A somewhat simpler interior arrangement for those who do not require the bulhead control.



The construction is of the stringer-batten type that proved so successful in Mr. Bacon's 22-foot V-bottom runabout in the March, 1911, issue of MoToR BoatinG.



Construction details; note that stringers are arranged to back up all seams in the planking, insuring a very strong and tight hull.

The STURDY MOTOR LIFEBOAT

Some Impressions of the Life Saving Service and Its Splendid New Self-Righting Motor Boats

By Wm. Washburn Nutting.

HAVE you ever had the good fortune to fall in with a life saving crew? I don't mean it in a literal sense, or when acting in its professional capacity, for few of us have straddled the breeches buoy or experienced directly the benefits of this splendid organization that is doing so much in reducing the perils of our coasts. It's not a popular organization, membership in it does not give entrée to the exclusive social world, nor is there about it much of the glamor and tinsel so usually confused with a dangerous profession. And yet I venture to say that nowhere in the world is there an organization freer from deadwood, dross and graft. Like the Canadian Mounted Police of the vast Northwest, unsung and far from the grandstand of public notice, these men perform their arduous and often hazardous duty—and, incidentally, may look forward to the exceedingly bountiful reward of perhaps two years' pension when they have become disabled or too old to serve longer. We're nothing, if not a generous people.

My first experience with the service was a mighty favorable one. We were off Cape Cod, bound for Gloucester from New York; we had passed the entrance to Nauset Inlet, prefering to enjoy from a distance its white line of breakers, and we were at a loss whether to keep on all night or to take a chance at the beach, for the Crow is a small boat, and there is no other break in the cymiter-like outer edge of the Cape. But when you have ridden the rail of an 18-foot Swampscott dory all day, your hands full of tiller and sheet, like the reins of a pitching broncho, a night on the beach looks mighty good. It's easy, too, to convince yourself that the surf is only mildly interesting when "you're on the outside looking in."

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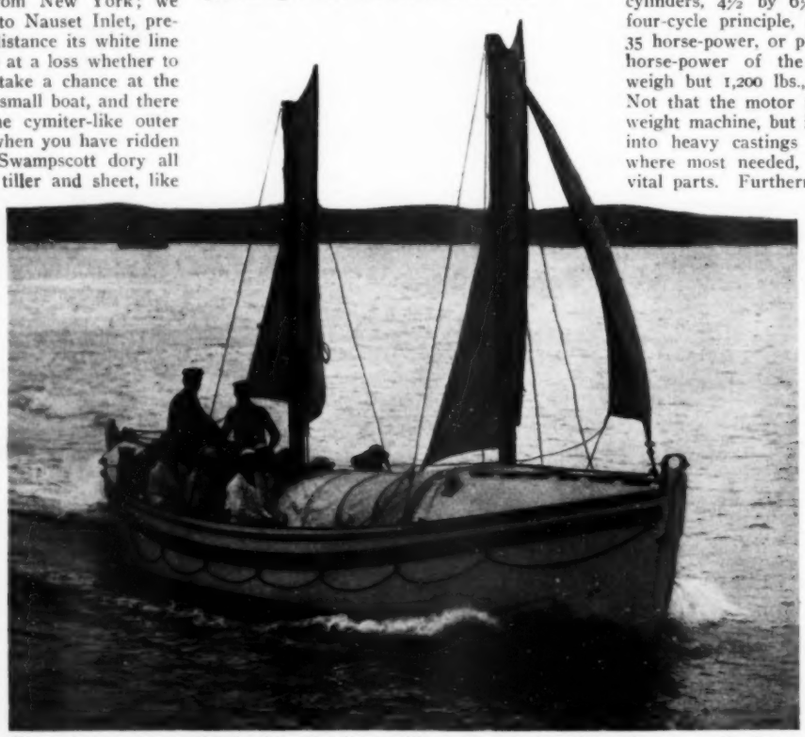

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The construction of the big fellows is interesting. The framing, keel, stem and stern post, are of white oak, but the planking is of mahogany, in two layers, each three-eighths of an inch in thickness. Except at the ends and amidships, in way of the centerboard trunk, the planks extend continuously from gunwale to gunwale, at an angle of 45 degrees, to the keel line. After the first layer is in place, number 10 canvas is applied and well bedded in paint. Then the second layer of planking is applied, crossing the first layer at an angle of 90 degrees. The decks are of similar construction, and the bulkheads are of 1¼-inch solid mahogany, while the whole fabric is strengthened with massive oak gunwales and fenders, making a structure that old Neptune himself couldn't phase with a pair of nut crackers.

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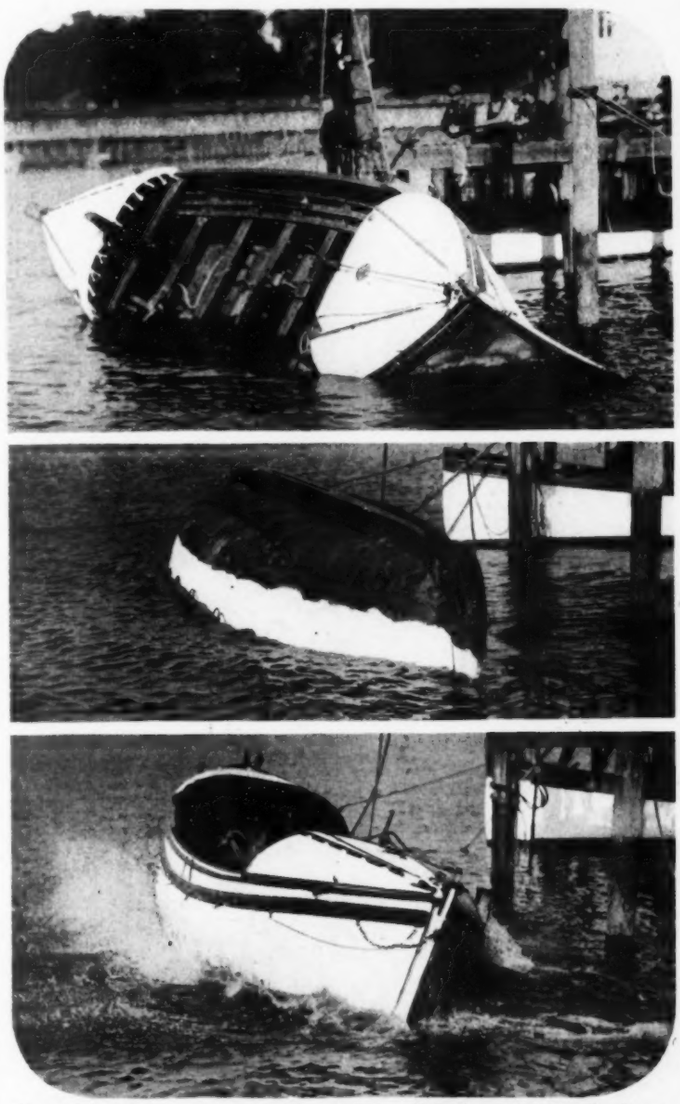

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(*Continued on page 47.*)

The STURDY MOTOR LIFEBOAT

Some Impressions of the Life Saving Service and Its Splendid New Self-Righting Motor Boats

By Wm. Washburn Nutting.

HAVE you ever had the good fortune to fall in with a life saving crew? I don't mean it in a literal sense, or when acting in its professional capacity, for few of us have straddled the breeches buoy or experienced directly the benefits of this splendid organization that is doing so much in reducing the perils of our coasts. It's not a popular organization, membership in it does not give entrée to the exclusive social world, nor is there about it much of the glamor and tinsel so usually confused with a dangerous profession. And yet I venture to say that nowhere in the world is there an organization freer from deadwood, dross and graft. Like the Canadian Mounted Police of the vast Northwest, unsung and far from the grandstand of public notice, these men perform their arduous and often hazardous duty—and, incidentally, may look forward to the exceedingly bountiful reward of perhaps two years' pension when they have become disabled or too old to serve longer. We're nothing, if not a generous people.

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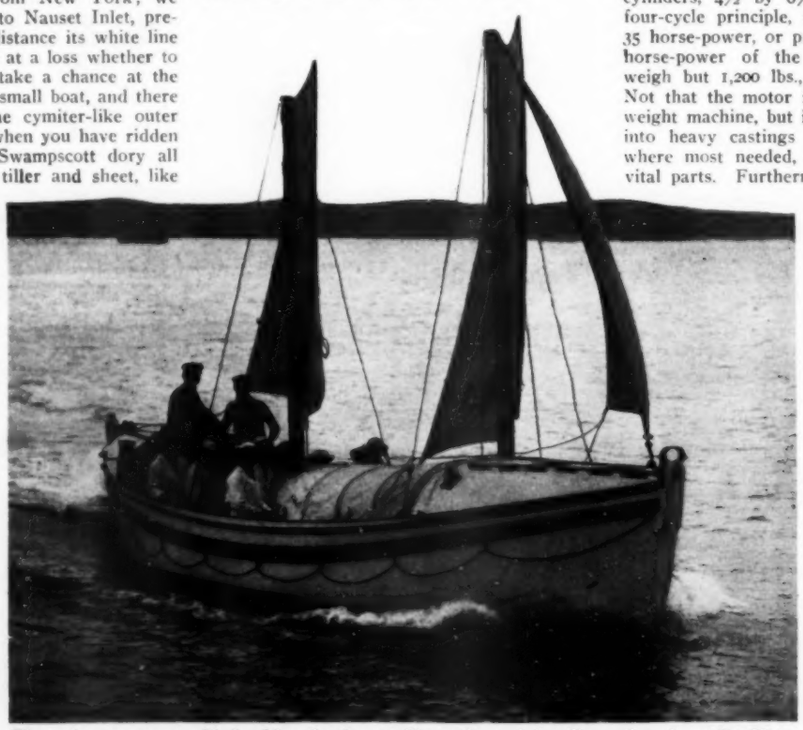

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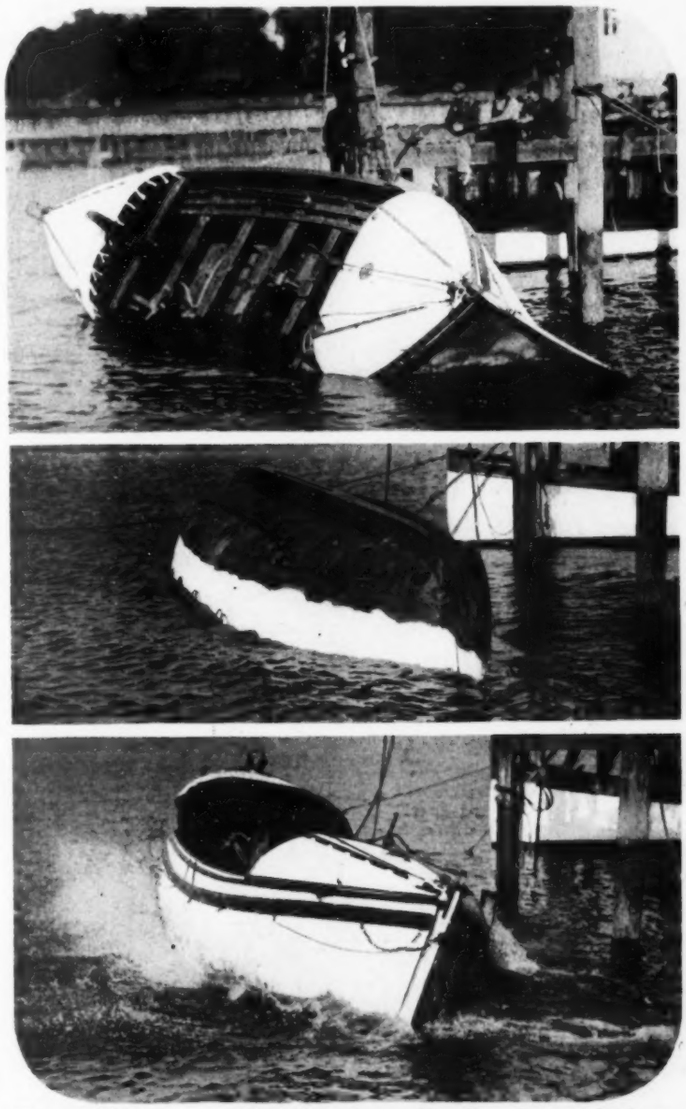

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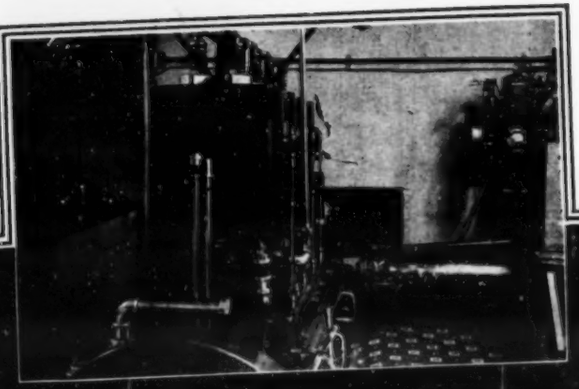
SHEILEENA

An Interesting 62-Footer for the West Coast Built in China.



The 50 H. P. Ralaco and the 2½ H.P. T. & M. that drives the generator.

The owner's stateroom is finished in Japanese Oak with neither stain nor varnish.

ONE of the most notable boats put overboard during the past season for a Pacific Coast yachtsman is Sheileena, owned by William Farrell, Esq., of Vancouver, B. C., and designed by James B. Wood, former owner of the well-known cruiser Clansman of Seattle, in conjunction with Brewer & McBride, naval architects, of Vancouver, B. C. Sheileena is different from other cruisers on the coast, in many ways, and she is unique in that while designed on the coast she was built in Hongkong, China, at the shipyards of the W. S. Bailey Company.

Mr. James Wood, being a sailor and familiar with boat building conditions in all parts of the world, decided that the economy in the matter of labor and the proximity of the Oriental woods that he desired to use, were all in favor of the Chinese plant. The teak, Philippine mahogany, yacal and other hardwoods that make up the boats, are almost as common in China as are fir, spruce and cedar on the Pacific Coast.

Sheileena is 60 ft. 2 in. over all, 12 ft. 6 in. beam and 4 ft. 8 in. draft. She is of the raised deck type, the deck extending about two-thirds of her length. Aft of this and on a level with her deck line is a short glass cabin. On the extreme after end there is a canvas protection, but the rest is without cover. A large pilot-house, which is so necessary in cruising along the North Pacific Coast, is located just forward of amidships, giving the pilot a clear view ahead and still protecting the house from the full force of any seas that might come over the bow. The interior of this pilot-house is finished in natural teak, handsomely polished, but without a touch of varnish or stain. The helmsman has ample room and there are accommodations for two to sleep in transoms on each side. The boat was built for strength.

as well as comfort and, with the exception of the decking, all the material is Oriental hardwood. The deck is of Oregon pine, with the molding and covering boards of teak. The other planking in the boat is teak, the keel is of yacal and the frames of ipil, copper-fastened throughout.

Sheileena's power plant consists of a 50-horsepower 4-cylinder Ralaco engine, which gives the craft a speed of about 11 miles. Thirty incandescent lights and the wants for small power are supplied by a 2½ h.p. T. & M. lighting engine, direct-connected to a 110-volt, 7-ampere generator. The fuel is carried in three tanks, with a total capacity of 485 gallons, all aft of the owner's stateroom under the deck and separated from the rest of the boat by a steel bulkhead. The boat is divided by three of these steel bulkheads, which are absolutely watertight. The after end of the engine room is divided by one of the bulkheads from the main saloon; this keeping noise and smell away from the living quarters and making them entirely separate from the crew's quarters. Forward of the engine room, which is considerably forward of amidships, are the quarters for the crew, and they are well ventliated and lighted. In the extreme bow is a 110-gallon freshwater tank, which supplies the entire boat by gravity flow.

Directly aft of the bulkhead, which divides the engine room from the living quarters, is the galley on the starboard side and a stateroom on the port side. A companionway to the pilot-house is also located here. Aft of the galley is the main saloon which is finished and furnished throughout in Philippine mahogany, which is hand-polished in the natural grain and color. It is lighted by four ports on each side and a skylight and a circular stairway, paneled in mahogany, leads to the upper deck. The main saloon is connected with the owner's stateroom by a passage finished in natural teak. A stateroom containing a single berth is located on the starboard side of the passage, while the bathroom occupies the space to port. This contains washstand, closet and full-sized bathtub.

The owner's stateroom is finished in a beautiful grain of Japanese oak, hand-polished. It contains two large berths and a large dressing-table, which is equipped with desk-drawer and backed by a large plateglass mirror. The room is also fitted with two large wardrobes and has a total of ten large drawers distributed about it. The room is lighted by eight large windows in the trunk cabin.

BRITISH GASOLINE-KEROSENE ENGINES.

The Thornycroft.

By J. Rendell Wilson.

PROBABLY no engineering and shipbuilding firm is better known throughout the world than Messrs. John J. Thornycroft & Co., Ltd., of London, Southampton, and Basingstoke, and needless to say, when entering the motor boating field some years ago, it was compatible with their reputation to place on the market a sound and substantial engine.

Before proceeding, I must mention in fairness to Thornycrofts, that the hydroplane Maple Leaf III, which made such a pitiful exhibition in the B. I. Trophy race, was neither built nor engined by the firm, although she was designed by Sir John Thornycroft. However, I do not think that anyone who witnessed the contest, no matter how critical he may have been, could have found fault with the hull design of Maple Leaf III, especially as hydroplanes are still in their infancy.

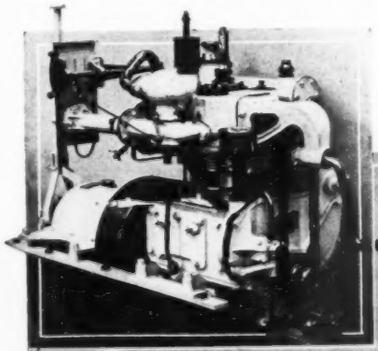
To return to the title subject. It has been found by the manufacturers that the "M" type of marine motor is one of the most popular of moderate powers which they turn out, so I propose to deal with it here. This type is made in one, two, four and six cylinders, and all run on gasoline or kerosene, as desired, the fuel consumption with either being .9 pints per brake horsepower hour. The four-cylinder set shown here is a very neat model, and is suitable for a raised-deck cruiser of 30 feet to 50 feet, or for a moderate-sized business boat. The cylinders have a bore of 4½ inches, by 6-inch stroke, and at 1,000 r.p.m. 30 brake horsepower is developed on kerosene and 36 b.h.p. on gasoline, working on the 4-cycle principle.

The cylinders are cast in pairs, and are water-jacketed for three-parts of their length, the water-pump being driven off the forward end of the crankshaft by gearing. It will be noticed that the valves are arranged on either side, the inlets being to the starboard and the exhausts on the port, while the valve tappet guides of each pair of valves are held down by one dog-clamp, secured in its turn by a single nut. Particularly large doors are fitted to the cast-iron crankcase, allowing free access to the big ends and main bearings.

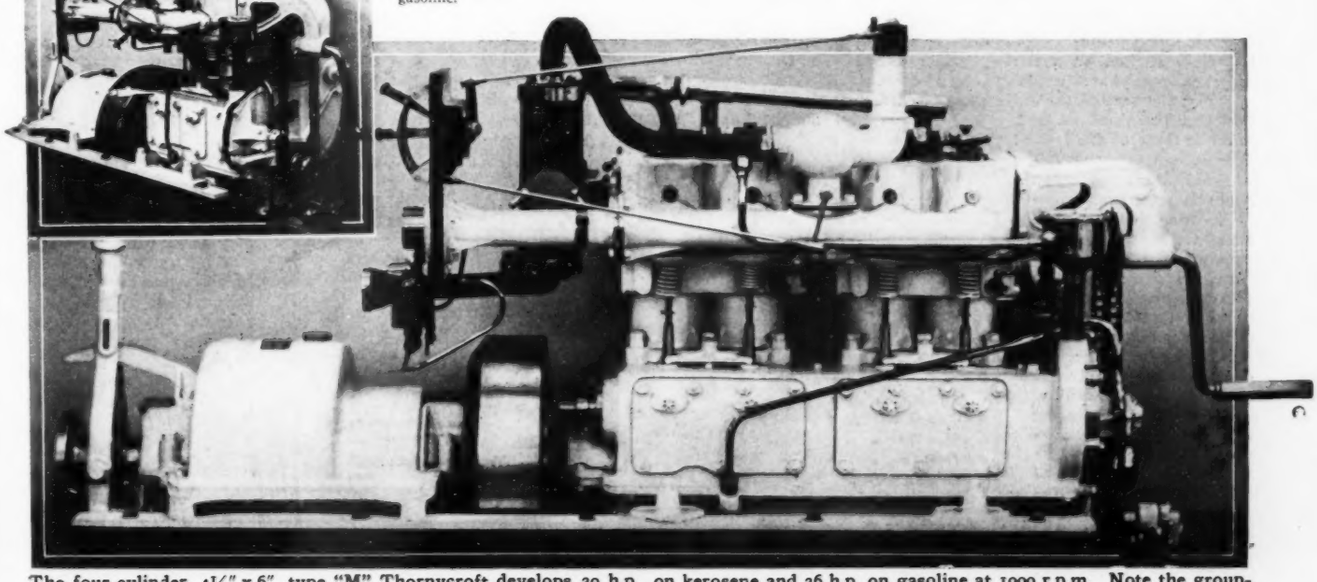
Lubrication is by force feed, this pump also being driven at the forward end. To the main feed pipe is fitted a simple relief valve connected to a pressure gauge on the control plate, so that the supply can be regulated to the correct quantity. The starting handle is permanently mounted on an inverted cast-iron frame on the forward cylinder, the drive being by chain. There is a small free-wheel clutch on the crankshaft, running on ball-bearings, similar to the free-wheel of a bicycle, allowing the handle to remain stationary while the engine is in motion. The reverse gear is of the epicyclic type with metal to metal cone clutch, and is operated by a single lever, although with the larger sizes, the control is by a wheel.

High-tension magneto (jump-spark) ignition is fitted, the magneto being driven by enclosed pinions off the exhaust camshaft, and the wiring is carried through a fiber insulating tube on the cylinder heads; while the sparking-plugs are placed in the inlet valve caps, where they are not likely to become fouled by excess oil thrown up by the pistons. If desired, battery and coil ignition can also be fitted.

The after end of the inlet pipe is extended, and a control plate is bolted to the flange. To this plate are fixed the gauges, air and throttle valve levers, and the switch. Being close to the reverse gear, and steering wheel of the boat, the arrangement makes a launch essentially single-handed. With reverse gear, bearers and control-plate the engine weighs 1,575 lbs., while with all installation fittings, tools, bolts, propeller, propeller shaft, muffler, and stern tube the equipment weighs 1,712 lbs., everything necessary for carrying out the installation being supplied and packed ready for shipment. Finally I may mention that Messrs. Thornycroft have taken up the Diesel engine, and are already fitting a new 600-ton auxiliary schooner with this power. They are also fitting a British torpedo-boat destroyer with a 1,000 h.p. Diesel engine in combination with turbines.



A two-cylinder type "M," developing 7½ h. p. on kerosene and 9 h p. on gasoline.



The four-cylinder, 4½" x 6", type "M" Thornycroft develops 30 h.p. on kerosene and 36 h.p. on gasoline at 1000 r.p.m. Note the grouping of the controls on the control plate aft, similar to our bulkhead control, the forward starting gear and the arrangement of the whole power plant on one frame.

THE PRIZE CONTEST IN QUESTIONS AND ANSWERS

THE answers to the first question this month are for the benefit of the sail boat fellows—God bless them. The motor boating fraternity has learned a lot from *them*—a lot of the sound fundamentals of seamanship without which no one deserves the name of boatman, whether he paddles a canoe or reclines in a wicker chair on the after deck of a hundred-footer. We admire the sportsmanlike spirit of those sailors who refuse power, prefering to "get there" by pitting their own resources against adverse wind and weather; but, after all, it's *the being able to do these things that counts*, and when one *is* able there is no sound reason why he should not take advantage of the opportunity of broadening the all-round ability of his yawl, sloop or schooner by installing auxiliary power.

IF auxiliary power is an advantage to the sailor, auxiliary sails are equally so to the followers of the motor. Not that motors nowadays fail as frequently as the wind, but because of the steadying influence of sails and the actual help they offer when the wind is abaft the beam. The second set of answers tells how to rig up such emergency sails on a motor cruiser.

THOSE who have cruised in the South need no warning against the teredo, and his abnormally developed taste for the planking of boats; but those who are planning their first cruise in the tropics may learn a lot from the answers to the last question.

THE QUESTIONS FOR THE MARCH CONTEST ARE THESE:

Give instructions, with drawings if necessary, for the construction of a folding or removable table for use in a small cruiser, indicating where it should be placed.

Suggested by J. L. Patton, Everett, Wash.

Tell how to construct a practical but simple rear starter for use at the bulkhead of a runabout.

Suggested by Harry Fellinge, Atchison, Kan.

Discuss kerosene vs. gasoline as a fuel for internal combustion engines.

Suggested by "Novis," Charleston, S. C.

ANSWERS to these questions, addressed to the Editor of MoToR BoatinG, 381 Fourth Ave., New York, must be: (*a*) In our hands on or before January 25, (*b*) not over 500 words long, (*c*) written on one side of the paper only, (*d*) accompanied by the senders' names and addresses. (The name will be withheld and initials or a pseudonym used if this is desired.) Questions for the next contest should reach us on or before the 25th of January.

THE PRIZES ARE:

For each of the best answers to the questions above, *any article* advertised in MoToR BoatinG, of which the advertised price does not exceed $25, or a credit of $25 on *any article* advertised in MoToR BoatinG which sells for more than that amount.

(*There are three prizes, one for each question, and a contestant need send in an answer to but one, if he does not care to answer all.*)

For each of the questions selected for use in the next contest, *any article* advertised in MoToR BoatinG, of which the advertised price does not exceed $5, or a credit of $5 on *any article* advertised in MoToR BoatinG, which sells for more than that amount.

For non-prize-winning answers published we will pay space rates.

When you send in your answers, state what you will take if you win a prize.

Installing Power In a Yawl.

Broadening the Efficiency of this Popular Type of Sailing Cruiser and the Problems to Be Met in Converting Such a Craft Into an Auxiliary.

THE PRIZE CONTEST—Answers to the First Question in the November Issue.

Arrangement for a 30-Footer.

The Prize Winning Answer.

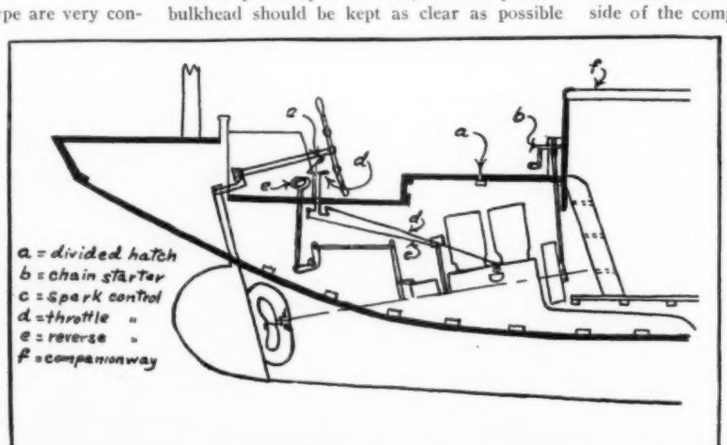
THE method of installing power in a cruising yawl depends largely, of course, on the type of the craft, whether of the keel or centerboard variety.

While those of the latter type are very convenient when navigating in shoal water, their cabin space is much more limited, owing to the centerboard trunk, and the more roomy keel boat is therefore the more desirable for cruising. In view of the fact that the boat in question is intended primarily for more or less extended trips, and that all space is to be utilized to the best advantage, let us assume that she is a yawl of the keel type, with a waterline length of thirty feet and with the engine installed under a hatch in the cockpit.

In nearly all boats of this style the companionway is in the center of the bulkhead. From the cockpit two or more steps lead down into the cabin. In order to crank the engine these must be raised or removed, which is very inconvenient. It is therefore desirable that one be able to start the machine without this trouble, making the removing of the steps necessary only in the event of repairs being needed. As the craft is primarily a sailboat, the cockpit and bulkhead should be kept as clear as possible of all obstructions which might interfere with the handling of the sheets and halyards in emergencies.

These various conditions would seem to be best met by a low divided hatch over the engine and a chain-starting device arranged on the bulkhead. This should be fitted with a removable crank and should be on the opposite side of the companionway from the halyards, thus reducing the possible danger of fouling them. The spark and throttle control and reverse levers may be led back to the wheel, thus making it possible for one man to handle the boat. This is often very desirable, as in coming into a strange harbor or in picking up a mooring there is usually work for all hands, particularly if under any sail in addition to power.

The gasoline tanks should be installed under the decks at the side of the cockpit and provided with drip-pans, draining overboard. There should be, under the engine, a similar pan, easily accessible for cleaning, as the



Bradford Edmonds suggests placing the motor under a bridge between cockpit and cabin.

smell of gasoline in the cabin of a cruiser is an abomination of the worst kind.

Oil and grease cans may be kept on a shelf under the cockpit floor, alongside the engine.

This installation gives the maximum of cabin room in a boat of this type, with the greatest accessibility of the engine and, moreover, provides for a cockpit fairly clear of obstructions.

BRADFORD C. EDMANDS,
Newton Centre, Mass.

Methods for Different Types of Hulls.

AS long as the yawl rig is maintained the term "cruising yawl" may be applied to different sizes and styles of hulls and various interior arrangements, each of which will present its own particular problems when one begins to put in power. In the general run of cruising sailing yachts of the smaller size, one finds the cockpit rather small, the room being given over to cabin accommodation, and it is assumed that such is the case in this instance.

As the question stands the answer must be general and not confined to one particular craft or type, and in order that this may be done, the different types of hulls will be divided into three general styles, embodying practically the entire field of construction. These will be: 1st, the out and out straight keel boat; 2nd, the centerboard; and 3rd, the deep fin-keel; and it is assumed in each case that the hull as originally constructed was not designed for power.

With the keel boat the first question which arises is the location of the propeller. The shaft may be run out on either side under the quarter, care being taken to keep the propeller far enough forward so that it will not interfere with the rudder, and while this arrangement looks rather odd when the boat is hauled out, it gives good service and has the advantage of being the cheapest to install. However, it acts as quite a drag when under sail. If it is decided to keep the wheel on the center line of the boat it usually becomes necessary after boring and getting the shaft log in place to lengthen out the run and have a new rudder post built in. A two-blade propeller is generally used and, being stopped in line with the rudder post, is very little drag when not in use, although the added length of the run makes the craft slower in stays.

Practically these same remarks will apply to the centerboard boat, although, as these are generally shoal draft craft and many of them lie on the beach over the tides, it is better to cut out the dead wood and put the wheel on the center line. This protects it more, as if it was on the side it might be crushed as the boat lay down when left by the tide.

The fin-keel, with its long over-hanging bow and stern, is perhaps the hardest proposition of all. As the fin is a solid mass a shaft cannot be placed there, and it is usual on this type to run it out on the center line under the counter, well braced from both sides, and swing the propeller just forward of the rudder.

So far the location of the propeller only has been considered and the engine ignored. The shape and interior arrangement of each individual boat will have a decided bearing upon this, the first requisite being a solid bed. In a recent number of MoToR BoatinG the location of engines was quite thoroughly discussed and the prevailing opinion was to keep the engine out of the cabin as much as possible. While the articles referred to were written with particular reference to power boats the ideas advanced will apply equally well in this case.

Without repeating the arguments from the various articles it is well to bear in mind that the cabin is to be the living quarters on a cruise and should be made as comfortable as possible, and to have an engine in it certainly does not add to the comfort of the living quarters.

F. M. COMEE, Cambridge, Mass.

An Ideal Power Installation.

WHEN installing power in a sailing yacht it is usually possible to keep the motor more in the background than is the case in a full powered motor cruiser. Not only is the sailing yacht a vessel of greater beam and draft than the motor boat, thus affording more room below, but the motor being intended as an auxiliary to the sails is of smaller relative size and may be "tucked away" in unused space where its presence may be well nigh forgotten until troublesome head winds or calms prompt the skipper to send a hand below to "start up the machine." As cruising yawls are generally arranged, space will be found for the motor beneath the cockpit floor, with a hatch above for ventilation and to make all parts easily accessible. It may readily be handled from below, the companion stairs being hinged at the top and made to hook up to the deck-beams when starting up or when repairs are necessary. The steps when in their usual position screen the motor compartment from view (while permitting free circulation of air about the engine), thus preventing the presence of a motor aboard from being too noticeable when the vessel is cruising under sail.

The usual strong and heavy construction of a cruising yacht will prevent any annoying vibration when the motor is running, provided the bed is heavy and securely bolted together and is in turn well secured to the boat's timbers and keelson.

Many auxiliary craft now have the engine installed off the center line of the hull, the propeller revolving well to one side of the stern post, in order to secure an unbroken flow of water to the wheel. While in some respects this is satisfactory practice, particularly with small, high-speed motors with small propellers operating in heavy hulls, yet in other ways it is not to be recommended. The tendency of the boat when rolling is to throw the wheel out of the water at every roll, causing racing to a degree often dangerous to the motor. It is also difficult in such an installation to keep the joint between planking and deadwood permanently tight, the vibration of the motor tending to loosen up the fastenings, however secure they may be when first put in place. The drag of the idle propeller when under sail alone is also greater than when the wheel is located behind the sternpost, in which position it is in the natural eddy caused by the passage of the vessel's hull through the water.

The best results in an auxiliary craft will probably be secured by installing a motor of the slow-speed, heavy-duty type, turning a two-bladed wheel of as large diameter as possible, with its shaft hole cut through the center of the sternpost. The flywheel of the motor should be marked when the blades of the propeller are in a vertical position (in line with the sternpost), so that when the motor is idle the wheel may be turned round to this position in order to reduce the drag as much as possible. When a reverse gear is fitted the lever should be kept in neutral position when under sail so that the wheel may revolve freely, the drag being then reduced to the minimum. The reverse lever and the throttle and spark controls should, if possible, be carried to the wheel to facilitate handling when under power.

The gasoline tank may be of cylindrical shape, preferably of copper, and should be substantial and well made. The writer has seen some good installations on large boats in which the tank was set on deck in saddles athwartships, being placed as nearly over the motor as possible and, needless to say, fastened very securely in place. This arrangement keeps all gasoline out of the cabin and affords ample natural flow to the carbureter. In small boats with water-tight cockpits two smaller tanks may be placed on the cockpit floor under the side seats and practically the same results will be accomplished.

A copper drip pan should be kept under the carbureter to catch any possible leakage, and the whole motor compartment should be always well ventilated and kept scrupulously clean.

Thoroughly in trim "alow and aloft," with her machinery properly installed and well cared for, the auxiliary cruising yawl certainly possesses possibilities as a pleasure craft equal to any type that floats.

ALLAN O. GOULD, Portland, Me.

Advantages of Off-Center Installation.

IT is hardly worth while to rip up a good cockpit floor or shift a bulkhead to make room for the motor which, in yawls, 25 or 30 feet long, may readily be installed under the floor with flywheel just inside the cabin; or, perhaps better, the power plant may be located under a box in the center of the cockpit providing the floor is high so that the box will not be too much in the way.

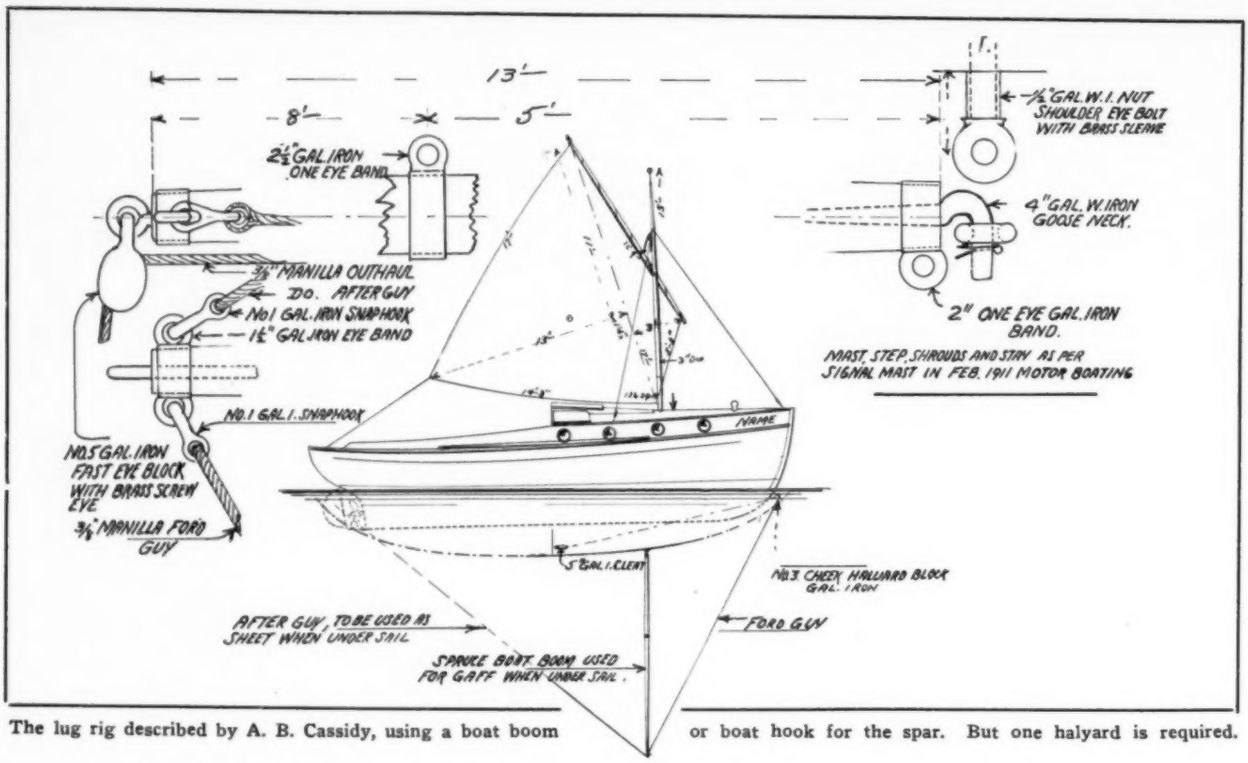
Expense attached to boring deadwood for the shaft is considerable in old boats or those that were not built for power because a lot of iron drift bolts will be encountered to destroy augers and drills and the process of worrying the hole through the resisting wood and metal makes the bill big. Nowadays, some of the best known yards recommend placing the shaft on one side of the deadwood, the shaft log being attached to deadwood and hull by bolts. A close fit is assured where the log butts against the planking, this part of the job seldom giving trouble in use. It is a simple matter to line up a shaft where the log is attached to the outside, and leaks that frequently appear in the shaft hole when bored through deadwood are eliminated because there is small likelihood of the outside log checking beyond possibility of calking.

The motor is lined up by placing it three or four inches off center to conform with the log, and trim of the boat is not affected so as to give a list if exhaust piping and whistle tank are installed to offset that tendency. I know of one 25-foot yawl that has its motor stowed high up on the port quarter with the shaft and propeller protruding like the leg of a duck. The motor is small, only three horsepower, and its foundation is really a shelf built in from the boat's skin. This arrangement gives freedom from machinery in the lazarette, does not shorten stowage space and, according to the owner, is in every way satisfactory.

When installing a motor in a sail craft be sure to have the propeller arch large enough, especially if the rudder has to be cut away to give space. By so doing you will lessen the liability of smashing the propeller when the wheel is thrown hard over to the jamming point. Propellers are prone to sucking driftwood, and a piece of log or timber might wreck the stern of a boat should it become wedged between the deadwood and rudder. And don't forget to leave plenty of space so that the propeller may be removed without unshipping the rudder. Backing chocks are far better than chain to prevent the rudder going too far to starboard or port when going astern. Some boats back so rank that they take charge of the helmsman, wrenching the wheel or tiller from his grasp. The chocks are pieces of wood attached to the deadwood that stop the swing of the rudder to about 30 degrees either way. Most all tugs and steam craft not equipped with steam steering gear are equipped with these preventers. In small craft the chocks make mighty good foothold when it becomes necessary to reach under the counter to remove eel grass or a piece of rope that has fouled the propeller.

For its all-round worth as a cruising boat the yawl would be hard to improve on. Its mainsail is somewhat smaller than that of a sloop of the same size, making it easily handled; and if properly designed it may be used alone or may be lowered to reef while the boat is driven under jib and jigger. And with the added advantage of auxiliary power, the combination is well night ideal.

G. S. H., Boston.


13'
8'
5'
2½" GAL. IRON ONE EYE BAND
⅜" MANILLA OUTHAUL
DO. AFTER GUY
No. 1 GAL. IRON SNAP HOOK
1½" GAL. IRON EYE BAND
No. 1 GAL. I. SNAPHOOK
No. 5 GAL. IRON FAST EYE BLOCK WITH BRASS SCREW EYE
⅜" MANILLA FORD GUY
1½" GAL. W. I. NUT SHOULDER EYE BOLT WITH BRASS SLEEVE
4" GAL. W. IRON GOOSE NECK.
2" ONE EYE GAL. IRON BAND.
MAST, STEP, SHROUDS AND STAY AS PER SIGNAL MAST IN FEB. 1911 MOTOR BOATING
NAME
5" GAL. I. CLEAT
No. 3 CHEEK HALLIARD BLOCK GAL. IRON
FORD GUY
AFTER GUY, TO BE USED AS SHEET WHEN UNDER SAIL
SPRUCE BOAT BOOM USED FOR GAFF WHEN UNDER SAIL.

The lug rig described by A. B. Cassidy, using a boat boom or boat hook for the spar. But one halyard is required.

Emergency Rigs for the Cruiser.

Excellent Suggestions for a Number of Practical Auxiliary Equipments Both for Steadying a Boat in a Seaway and for Propelling Her in Case of a Break-down.

THE PRIZE CONTEST—Answers to the Second Question in the November Issue.

An Ingenious Lug Rig.

The Prize Winning Answer.

THE accompanying sketch of a 30-foot raised deck cruiser provides for a signal mast, with hinged step, and supported on the deck, braced with ¼-inch galvanized wire rope shrouds and stay set up with turnbuckle as illustrated in February, 1911.

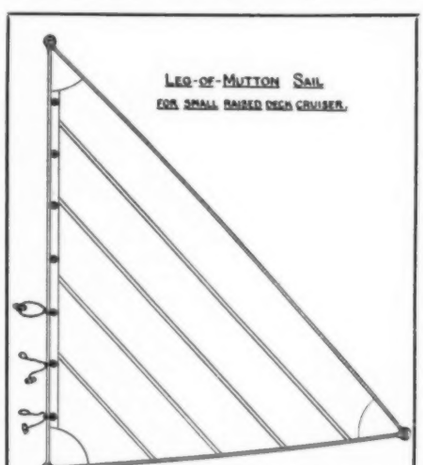
The sail should be made of No. 6 canvas double seamed for strength, with the usual tabling and roped. There should be large brass grommets in the head spaced about 9 inches. When not required the sail can be neatly folded and stowed away under the cabin cushions or be used as a cushion with a fancy cover over it. The gaff is a boat boom doing duty to keep the dinghy away from the "yacht," or can be stored against the side and secured to eyes. The boom is large enough to allow a boat of 12 or 13 feet in length to swing clear of the " yacht" if outhaul is snapped into after side of stem. The boat painter will be the inhaul.

When the boom is rigged out it is supported by the topping lift rove through a No. 7, 2½-inch galvanized iron block with swivel eye, which in turn is secured with strap or grommet through eye around the mast.

When the boom is unshipped and used as the gaff of the sail, the topping lift is the halyard; the standing part of halyards or topping lift being spliced around a thimble in the eye of a galvanized iron snap hook.

The outhaul is snapped into grommet in the peak of the sail, and the hauling part passed around the spar through the grommets in the head of the sail and finally secures the throat of the sail to the outboard end of the spar. The after guy is to be snapped into the clew of sail for the sheet. The standing part of the forward guy is to be secured to the cleat when the hauling part is belayed.

A. B. CASSIDY, Wollaston, Mass.



A. O. Goold's leg o' mutton sail, with toggle lines obviating the necessity of hooks or knots.

Leg o' Mutton or Storm-Trisail.

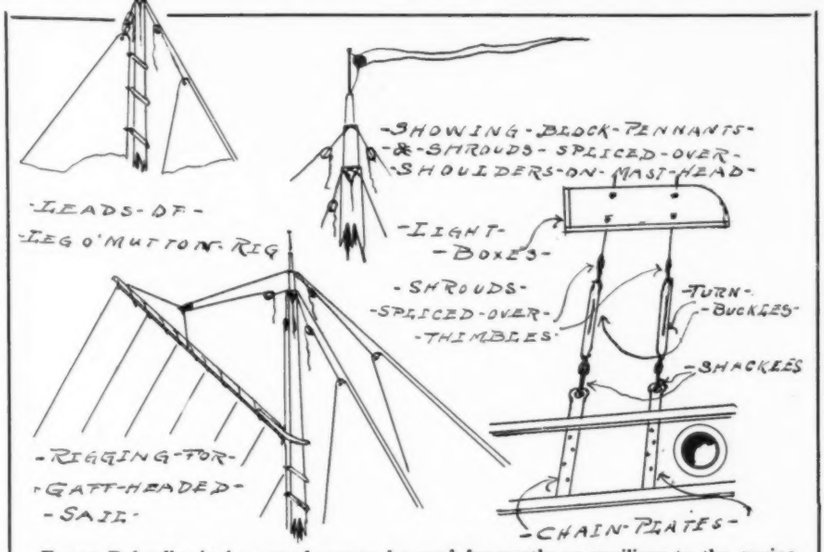
WHILE it is perhaps somewhat deficient in driving power in light winds. no emergency sail possesses as many all-round good points to recommend it as the loose-footed leg-of-mutton—the "storm-trisail" of the Gloucester fisherman. This sail requires no spars whatever, excepting, of course, the mast, upon which it hoists with a single halyard. It is held to the mast when set by rope, loops and wood toggles which permit of its being easily and quickly bent on or taken off. When unbent for stowage below it may be compactly bundled up and lashed round with its own sheet, in which shape it will fit into any average locker without overcrowding. When set it trims aft with a single sheet which, excepting in large sizes, need consist of but one part, although if a purchase is found necessary a single block may be used on the clew, thus doubling the power, and which simple tackle will usually suffice to trim the sail flat in any sort of breeze. In rough water there is with this rig no heavy boom, gaff or sprit to thrash violently across the boat at every roll, while its triangular shape carries the center of effort low, greatly lessening its heeling action on the hull and reducing the strain on mast, hull and rigging. A jib may be readily carried with the leg-of-mutton mainsail, being snap-hooked to the fore-stay in the usual fashion.

In making a trisail at home the amateur sailmaker will probably encounter some knotty problems. The mastery of the "palm" or sailmakers thimble is not quite as easy as it appears, while the formidable triangular sail-needle has a vicious look to one not versed in its ways. Eight-ounce duck will probably be about the right material for the mainsail, while the jib, if one is desired, may be made of stout drilling. The cloths should be narrow for these small sails, and the seams should be lapped about an inch. In cutting the sail do not forget the round or "roach" on the leach and foot, since the strain of service will gradually pull it straight, whereas, if cut straight at first, it will hollow in badly and lose its shape in a short time. The cloths should run parallel with the leach (after edge) of the sail. Strengthening patches should be put in at the corners of the sail, for at these points the greatest strain is felt. Sew a stout cotton bolt-rope round the edge of the entire sail, putting in a brass or galvanized cringle in each corner for halyard, sheet and tack-lashing. Cotton bolt-rope (about ⅜" diameter) is best, as it stretches and shrinks about the same amount as the sail when wet and dry.

A duck reinforcing band should be run the whole length of the luff or hoist of the sail and through this band at intervals of about eighteen inches put in metal grommets for the toggle lines, which take the place of mast-hoops. These toggle lines should be of cotton rope, eye-spliced at one end and spliced tightly into a deep groove in the middle of the oak peg or toggle at the other. This toggle should be the right size to "button" easily into the eye-splice. These toggle lines should be tied into the grommet holes leaving the two loose ends of about equal length and just long enough to go round the mast and fasten on the forward side without much slack.

In setting the sail the tack should first be securely lashed down to a stout galvanized screw eye-bolt in the mast about a foot above the deck. Then the toggles should be fastened round the mast in turn, and the halyard hooked into the head cringle, the sail hoisted and sheeted home. For the man who demands absolute simplicity in his emergency rig the above outfit should prove to be about what he desires.

ALLAN O. GOOLD,
Portland, Me.



Ernest Roland's rig is a good one to be used frequently as auxiliary to the engine, but is a little elaborate for an "emergency rig."

Recommends Gaff-Headed Mainsail.

TO begin with, what's the best kind? That depends on the boat. If you have a long, narrow soft-bilged craft, two leg-o'-muttons, loose-footed, and a jib and, if the boat is long enough, foresail and jib.

But the best driving sail of all is undoubtedly a gaff-headed sail. A jigger is a fine thing to heave to under, or lay to under a sea anchor. The ordinary auxiliary won't lay to under ordinary sail the way a sail boat does on account of her propeller.

A square sail on the foremast is also a fine thing to have when you know how to handle it. The average man to-day does not.

Whatever rig you use, by all means, have the mast stepped right down onto the keel—not merely resting in a socket on deck, with only the shrouds and stays to hold it up.

Another thing, have all your spars of spruce. I have seen that material bend almost in two before breaking. It is very stiff and strong and extremely light. The mast does not deteriorate the general appearance of a cabin in the least, in fact, can be made to add to the appearance.

At the mast head a couple of shoulders can be worked, the upper one of smaller diameter than the lower one. The shrouds and block pennants can have eye-splices in their upper ends, and these merely have to be slipped over the mast head to be perfectly secure.

The gaff can have either wood or forged iron jaws without choice.

Wood mast hoops are most advisable, they don't rust or stick.

Wood blocks are the most shipshape. A wood block with patent roller sheaves is an expensive article, but well worth the expense. When buying blocks get them a size larger than the ones the clerk tells you will fit your rope, then when your rope swells in wet weather it won't stick with the sail half the way up. Keep the sheaves well oiled, it will treble the life of your block and double the life of the gear.

The stuff for the running rigging should be the best three-strand hemp. The four-strand has a most despicable habit of kinking at the wrong moment and in the wrong place, besides stretching and shrinking like a worm in the different changes of temperature. A way of doctoring this is to stretch it tight between two objects on a sunshiny day, until it can stretch no more, to water it thoroughly or leave it out in the rain for a day or so while thus stretched. Now, be sure and let it dry thoroughly after which it is ready to use.

The halyards of a leg-o'-mutton sail and of a gaff-headed sail depend upon their size, but those shown in the accompanying sketch are for the average size. Jibs and staysails may be set flying.

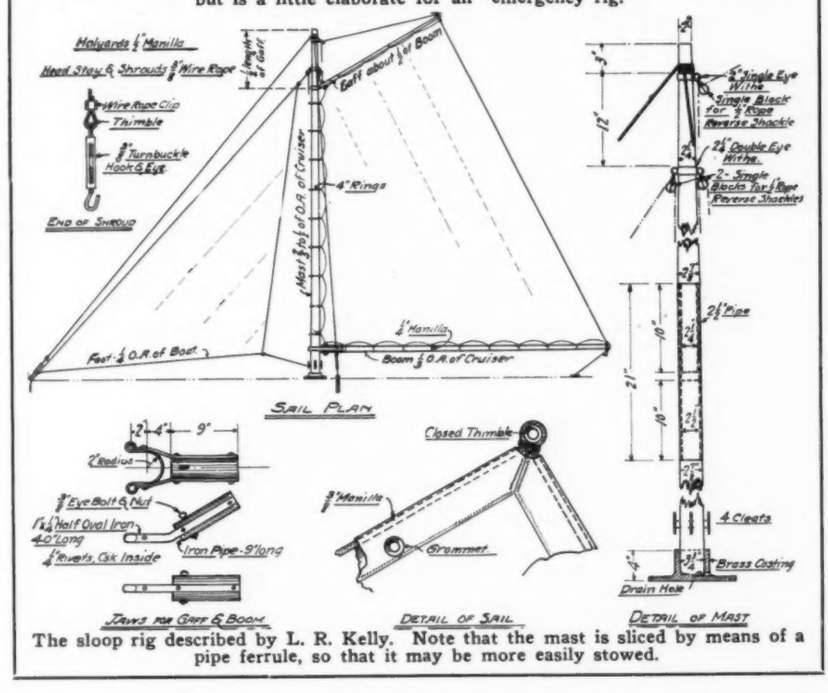
Wire galvanized is excellent stuff for standing rigging. The shrouds can be double. The light-boxes can be set at a convenient height in the rigging with great advantage. They are easier to reach, the shrouds are excellent to hold on to when attending the lights, and give, moreover, the double advantage of being seen from afar, and are perfectly protected from the waves and spray.

The sheets should be double, one leading to either side of the boat, the leeward one being used to trim the sail.

A sail should be trimmed thus: Ease your sheet till it begins to flap, then haul in on the sheet till this stops, and make fast.

The method of securing stays is this: An eye-splice in a thimble around one end of a turnbuckle, the other end is shackled to chain plates of generous size and makes about the most secure fastening.

ERNEST ROLLAND,
Montreal, Canada.



The sloop rig described by L. R. Kelly. Note that the mast is sliced by means of a pipe ferrule, so that it may be more easily stowed.

The Sloop Rig.

THE mast is straight-grained, clear spruce in length from ⅔ to ½ overall length of cruiser, depending upon freeboard, beam, etc. It tapers from 3¾ in. at the heel to 2 in. at the top, and cut into halves, a length of 2½ in. pipe forced on the bottom section and the upper section fitting loose enough for easy removal. The pipe is fitted so that mast adjoining is flush with it. The necessity for cutting was for convenience in stowing. Of course, if it can be stowed full length, so much better.

The signal mast and yard arm on your cruiser will be converted into the boom and gaff by slipping them into the pipe to which the jaws are riveted and being held there by an eye-bolt going through pipe and wood (see detail of jaws). The proportions given on sail plan are about the average length, but can vary to suit cruiser. If you have no signal mast, either secure one, or else carry these extra sticks stowed away with mast. A block already at the end of our signal mast will do for the ½ in. sheet.

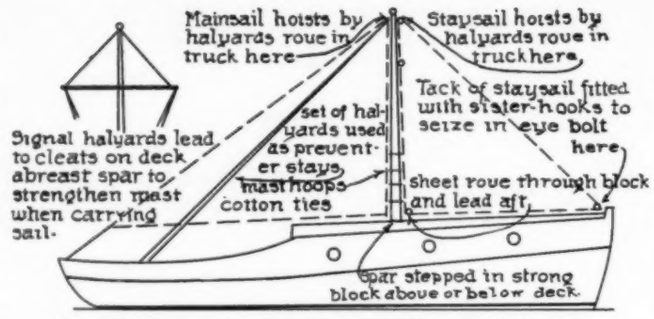
The mast fittings are clearly shown on the detail, and while others may be used, the ones shown are the best. A double and a single-eye with 3 blocks, reverse shacks for ½ in.

rope; ½ in. manilla for halyards; ⅜ in. wire rope for shrouds and head stay, provided with an eye splice slipping over mast head at upper end, lower end with a ⅜ in. hook and eye turnbuckle, engaging into an eye-plate securely fastened to frame at bow and 1 foot aft of mast on sides; 4 in. mast rings, 4 cleats at foot of mast; and a substantial brass socket for mast, securely bolted through to extra deck beams which must be provided to take care of the weight and strain of mast.

The mast should be located about one-third the overall length of cruiser, from the bow. All iron fittings should be galvanized. The ½ in. halyards should be used with the regular boat ropes, so that you will know in what condition they are, since your emergency sail may not call for their use very often and by that time, if stowed away, they may not be in condition.

The sails should be made by a sailmaker, and in ordering give the length of all sides and the diagonals of the mains'l. These dimensions will depend upon the length of mast, boom and gaff and where you have stepped your mast. They are made of 22 in. 10 oz. sail duck; seams double-sewed, lapped about an inch, and running as indicated by dotted lines on sail plan. The sides are turned over ⅜ in. manila. Closed thimbles are fastened in at all corners, as shown in sail detail. Brass grommets are spaced about a foot apart along gaff, mast and boom of mains'l ¼ in. manilla is used for fastening these to gaff and boom and to mast rings. These sails should be stowed in a dry place, and whole equipment should *always* be carried.

L. R. KELLEY, Philadelphia, Pa.


Mainsail hoists by halyards roue in truck here
Staysail hoists by halyards roue in truck here
Tack of staysail fitted with sister-hooks to seize in eye bolt here
set of halyards used as preventer stays
mast hoops
cotton ties
Signal halyards lead to cleats on deck abreast spar to strengthen mast when carrying sail.
sheet roue through block and lead aft
Spar stepped in strong block above or below deck.

An excellent emergency rig recommended by E. A. Crawford.

Neither Gaff nor Boom.

THE use of sail as an auxiliary power is a much discussed topic among motor boatmen at the present time, and while most everyone has an idea of his own they all agree that an ideal rig must comprise the following items, efficiency, compactness for stowage, and ease in setting and handling. Another point to be considered is the fact that one does not wish to litter his decks with a lot of running gear which will probably be used only a few times each season.

The following sketch shows a rig that requires neither gaff nor boom, two difficult objects to stow away when not in use, in fact, the only addition is the canvas which can be folded up and kept in a locker, and two additional sets of halyards to hoist the mainsail and staysail.

On the average raised deck cruiser it may be necessary to restep the signal spar so it will be firm enough to carry sail; still this is easily done by using a strong-back bolted across the top, or inside, of the cabin, and the addition of heavier signal halyards and blocks. Five sets of halyards are shown, three leading from the truck, the forward set being used to hoist the staysail, one of the after sets to hoist the mainsail, and the other to be used as a preventer stay to strengthen the spar. The sets on each side of the signal yard are led to cleats abreast the spar and take the place of swifters when sails are set.

The sails are of eight-ounce duck roped with manilla. The staysail is fitted with sister-hooks, or a snap-hook if preferred, to hook in an eyebolt, either in the stem-head or on deck, as far forward as possible. For mast hoops on the mainsail small ties similar to reef points are used, securing the upper one on the canvas so it will just reach the spreader.

The sail plan is simple, both sails being of the triangle, or leg-o'-mutton type, having a flat foot as long as convenient and the hoist to suit conditions which vary on different types of boats.

While this suit of sails are of simple construction, to make them so they will fit perfectly is a big undertaking for an amateur and unless the maker has had some experience in sewing canvas it will pay him to have them made in a sail loft, for sewing with a palm and needle is slow and tedious work for the one inexperienced in their use, to say nothing of the exasperation of reaching the end of a long seam and finding you have drawn one piece more than its mate and one end of your seam 6 inches longer than the other. However, nothing teaches like experience, and if one wishes to while away the "long winter's evenings" there is no better chance than to make them yourself.

It is first necessary to measure up the amount of canvas required by laying out the size of the sail on a floor with chalk, and in estimating the amount figure on the canvas to run fore and aft, or to have the seams parallel with the foot of the sail. A good plan is to tack it down on the floor if possible and then baste together with large stitches before removing. The seams should lap about an inch, that is, the edges should lap over to the colored thread in the goods and both edges sewn with sail twine well rubbed with beeswax to prevent it knotting.

For roping use about ⅜ in. diameter manilla and sew securely all around with a roping stitch for every strand. As manilla will stretch more than the canvas it is advisable to stretch the rope before using and slightly pucker the sail when roping. The cringles at the head, tack and sheet, may be made by seizing a small bight of the rope, fitting same with thimble; or patent brass ones can be used if desired.

This outfit will meet all requirements as an emergency rig and on long cruises with a fair breeze will add a few knots to the boat's speed.

E. A. CRAWFORD, Newark, N. J.

Preparing for Southern Waters.

How to Protect the Boat's Planking from the Ravages of the Ravenous Teredo. The Relative Advantages of Copper Sheathing and of the Various Liquid Preparations.

THE PRIZE CONTEST—Answers to the Third Question in the November Issue.

A Combination Method.

The Prize Winning Answer.

HAVING spent the last few winters in Southern waters, I ascertained several pertinent facts: First, the teredo navalis has in some localities, like the West Indies, an abnormal appetite for all kinds of wood, and in others will attack only the hard varieties like oak, etc. Second, that while some of the copper paints have a resistive quality, almost the instant that the paint is rubbed off, by grating your keel on the ever-present oyster bar, or the sharp flint-like sand, the borer is ready and waiting for business; and last, that the only sure deterent of this destructive pest, is something that will dull his teeth and make entrance impossible.

In fitting out two boats last year for the Florida service we took advantage of the fact that soft woods like pine planking, etc., were practically immune from attack in those latitudes, while oak seemed to be a special dainty. So we coppered the keel on the bottom and up on the sides, to just above the garboard strake, covering the parts where rubbing off the paint was probable.

This is not expensive or a difficult job and can be done by the veriest amateur following the simple directions herewith, which will neatly and thoroughly protect a boat from damage and destruction: We first gave the under-bodies a coat of copper paint—one kind is made in Boston and the other in New Jersey—and both work equally well. Then we cut our copper sheathing (you can get it in all weights and sizes) as long as the sheet and wide enough to go from just above the keel on one side, down under and up on the other side, holding it in place along the edges by No. 6 or 8 copper tacks, driven about one inch apart—this depends on the thickness of sheathing and plank. Commence at the deadwood of your boat working forward, so that the laps will overhang towards the stern. Tack closely as above, covering the garboard, press the copper closely to the side of the keel and put in a row of tacks just below the junction of strake, then another, spaced wider apart, say three inches, along the middle of the keel, and another row just above the turn around the bottom. Punch just through the copper and far enough into the hard wood to prevent the tack from bending over, with any sharp-pointed instrument, that will not leave a ragged hole; finish on the other side in a similar manner. Then proceed with another section, tacking the laps closely and firmly, working forward until you are near the bow; bend this last piece around the stem, bringing it back, tacking and lapping as before; fasten edges and seams closely and you will have a well-sheathed boat, that can defy the borer in any waters.

It frequently happens that the rudder-post, the rudder and the skag become so weakened by electrolysis that they will break like a rotten stick, as the warm salt water of the bays and creeks seem to attack the iron much quicker than the colder medium of the open channels. Lead paints only hasten the destruction, but graphite acts as an excellent preservative.

This year I am adopting a new idea to prevent this corrosion, just above the shaft on the deadwood is fastened a piece of zinc, like the half of an apple, made by melting dry battery covers in a small ladle. It works out in theory, and on a small scale experimentally, and why not in practice. It is exceedingly simple, and I think will be of great value in doing away with the inevitable eating up of black and galvanized iron work in these salt-saturated waters.

MATT MCCARTY, Albany, N. Y.

Depends upon Length of Cruise.

IF a boat is to be used in the salt water of the South it is absolutely necessary that her underbody should be protected. This may be done either by coppering her bottom or painting with copper paint, each method having its own advantages and disadvantages.

The copper metal itself, which is manufactured in sheets for this purpose and fastened on with flat-headed copper nails, gives the best protection and should be used in all cases where a long cruise in these waters is to be taken. Its life is long as the sheets wear down very thin and may be patched as holes appear. Care should be taken to see that all the edges are securely fastened down as it is surprising how quickly a loose edge will be started and the sheet of metal torn by the action of the water like so much paper.

Of course, the copper adds weight to the boat and slows her up a bit, but on the other hand it does not require the constant care that paint does. If the bottom is painted it must be watched closely and repainted at the first sign of wear and as often as is necessary as it is only by keeping on a good thick coat that one will get the desired protection.

If worms should get a hold on the painted bottom a run in freshwater for a few days will kill them, for they cannot live there and a fresh coat should be put on before returning to the salt water.

To sum up: the copper bottom is the best for a long stay in Southern waters, as it gives absolute protection to the hull without the constant care demanded by the painted bottom, while the paint will answer for a short cruise when one will soon leave these waters.

F. M. COMEE, Cambridge, Mass.

Tar and Creosote.

NEXT to a sheathing of copper, which is, although rather expensive and difficult to keep in shape, the best bottom for Southern waters, I will call your notice to a very cheap and very effective preparation to resist the marine inhabitants of that part of the yachtsman's paradise. The ingredients of this compound are tar and creosote, the stuff that most of the railroads use as a preservative for ties.

Pour the melted pitch into the creosote and stir until it is of the consistency of paint and apply as you would ordinary paint, rubbing it well into all cracks and seams. Give the wood all it will drink and then one coat over that. Be sure and have the bottom dry and as free from paint as possible. This preparation is, perhaps, new to most boatmen, but before long it will be used widely, as it not only is a preventive against the teredo, but it will preserve the wood.

HARRY FELLINGE, Atchison, Kan.

Beware the Teredo!

FEW of us realize that among the animals one of man's greatest enemies is the teredo, a mollusk, commonly called "shipworm." This worm may be found anywhere from a few inches to more than a foot in length, varying with age and species.

We must prepare to meet this worm in Southern waters. Its work is very destructive as it burrows into the wooden hulls of ships honeycombing the wood, although the surface may apparently be unharmed. The teredos, which are found in all sea waters, have no affinity for iron. Several species inhabit the eastern coast of the United States, where they produce havoc to the bottom of boats, wooden piers and piles. No wood is too hard for them to burrow into. It was this worm which threatened to destroy the dikes of Holland and submerge the country.

I have heard of a ferryboat, which was accidently sunk and four months later when raised, was found to be absolutely useless, so completely had the work of this worm been done.

Creosote has been tried as a preventive, but without success. A coating of coal tar and silicate of lime, such as is used for coating stone-work, was used, but this also has proven useless. Large headed nails driven in close proximity have been successful in preventing the worm's work, but in my opinion this task must be rather tedious and very likely to disfigure the bottom of the boat. A better protection, in fact one of the best and surest, is the covering of the bottom of the boat with copper sheathing which is used in many cases. At present there are also a number of reliable firms which place preparations on the market which are no doubt valuable. Several names are given to these preparations, such as metallic bronze bottom paint and anti-fouling paint, and they are the only substitute for copper sheathing as a protection against the teredo.

CHAS. J. ROESE, Buffalo, N. Y.

How to Sheath Small Boats.

IT is well for the person contemplating a trip in tropical waters to remember the fact that his boat will foul much quicker in tropical waters than in the cooler water of the north, to say nothing of the fact that she will be subjected to the ravages of the teredo or boring-worm, unless her bottom is thoroughly protected. Grass and barnacles practically do no harm with the exception of reducing the speed somewhat, but in a short exposure to the teredo the submerged part of the planking will resemble a sponge.

The best prevention against these borers is to sheath the bottom with copper, having first covered the hull over which the copper is laid with a layer of heavy building paper thoroughly coated in the inside with Stockholm tar. Although this is expensive it is the most effective remedy and the first cost is soon saved by not having to haul out and paint every three or four months, as is the case with paint preparations. It also offers the advantage in the ease with which marine growths may be removed—a scrubbing brush and a bucket of water being all the tools necessary.

On large or medium-sized boats it is a simple matter to apply as, after the sheets have been properly punched for nailing, all that is necessary is to lay them smoothly, being sure to nail carefully, using composition nails for every punched hole, so as to leave no openings. When applied to small boats it is a different problem—that is, on launches where the planking is comparatively light in thickness—owing to the fact that a nail to take a good hold will be long enough to go through the planking causing the boat to leak. This, however, can be overcome successfully in the following manner: Solder two or more sheets together, or enough to reach from the waterline to the bottom of the keel, allowing a couple of inches lap on keel and apply athwartships, instead of fore and aft, making the laps meet at the ribs. This will allow the long nails to become embedded in the ribs instead of protruding through the planking.

In fitting begin at the waterline and work down, and if the center of the ribs are noted at the waterline and the keel there will be no reason for missing them when punching. If desirous of coppering the bottom of the keel, which is really necessary for a long stay in tropical waters, a strip of metal heavier than that used on the side should be tacked along the whole length of the keel and turned up at the edges and tacked in place high enough to allow the edge of the metal covering the sides to extend over it and be securely nailed, thus fastening both keel and side metal at once.

This method may be expensive, as copper for a 30 by 8 cruiser will cost in the neighborhood of one hundred dollars, but in figuring hauling out, labor,, materials, etc., it will only require about three years to pay for the copper, and, as the sheathing will practically outlast the hull, it is readily seen that it is the most economical in the long run.

CHAS. MACILROY, New York City.

A Lesson from the Merchantmen.

MANY yachts leave Boston each fall for Florida waters and the method employed in protecting their underbodies from ravages of the teredo are few, but painstaking and exceedingly thorough. Two large yacht yards do the bulk of this work and both follow the same procedure. In the case of large craft the bottoms are sheathed with copper or composition, the sheets on the keel, stern and stem being 1/20 of an inch thick and elsewhere 1/60 of an inch.

Care has to be exercised that the sheets are joined so carefully that there is no place through which the destructive worm can find his way to the wood. The sheets are lapped and secured with composition nails closely spaced. The sheets at the waterline lap the next lower coating and those immediately aft so there is practically no added resistance in driving the yacht. Between the sheeting and wood tarred paper is sometimes placed as a repellent in case a worm crawls through a hole where a nail has dropped out or the sheeting has become abraded.

Galvanic action now and then attacks sheathed yachts and in a short time ruins the copper. One Boston yacht now in Florida waters could not keep the copper at her waterline more than two months, chemical action eating it away clean to the wood. This yacht, when she sailed recently for the South, had the copper sheathing up to within six inches of the loadline and the wetted space above was painted with copper compound, the best obtainable.

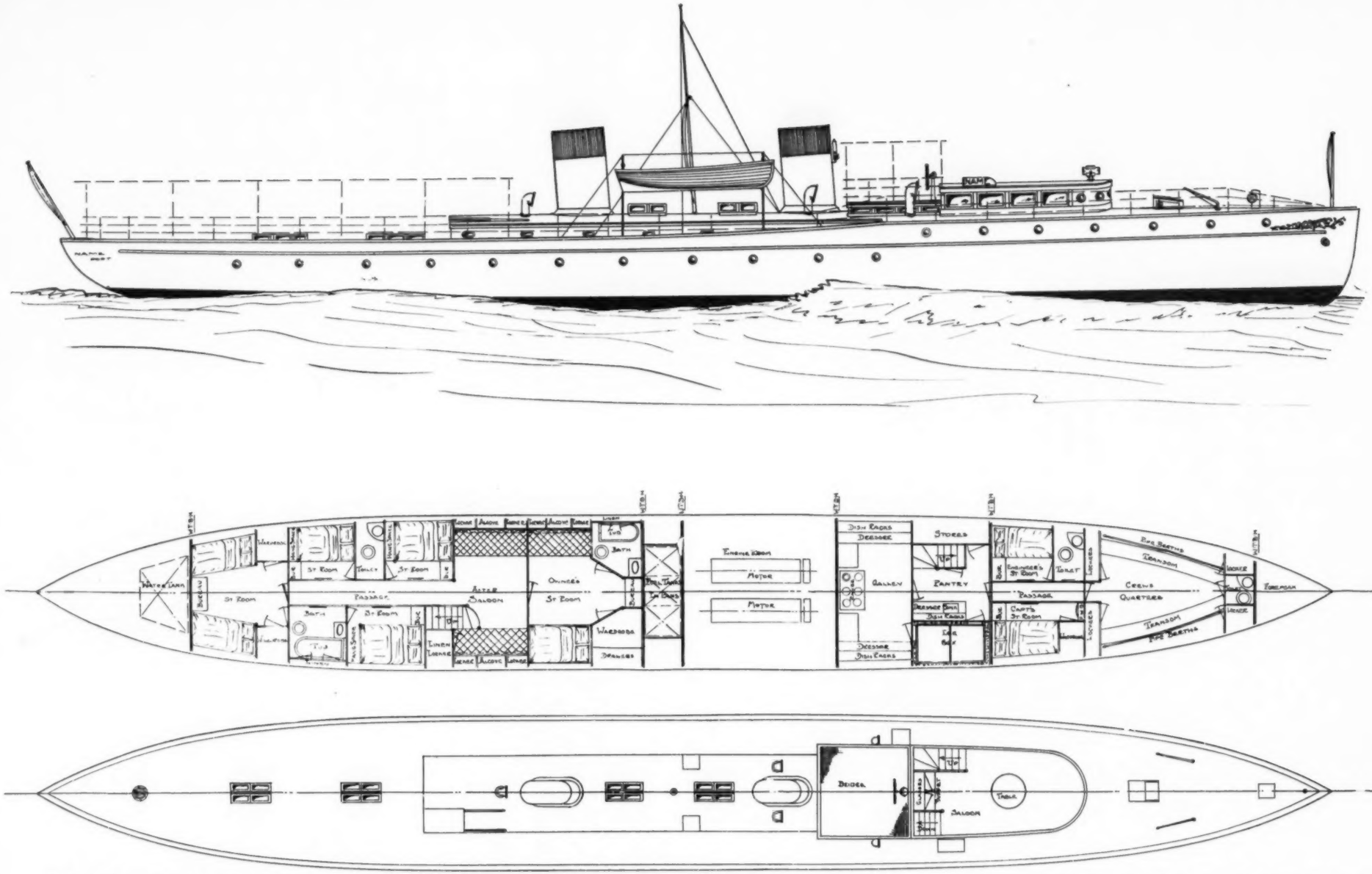
Small yachts, say those 35 or 40 feet long, are seldom coppered owing to expense which ranges from $150 to $200, according to where the job is done. It has been found that a good copper compound will keep the teredo out of the wood if coatings are applied frequently, say every two months. A 35-footer can be hauled out, cleaned and repainted for about $20 or perhaps less, at many places in the South, and the teredo is unable to do much boring with fresh copper compound to nauseate him and grit his teeth.

One Boston 30-footer spent last winter at Miami and was cleaned and repainted twice. On arrival back her bottom was in perfect condition and there was no trace of inroads by insects. When this boat went South a few weeks ago for another winter sojourn she had been treated with a coat of ordinary copper compound which the owner considered ample protection till January when another coat will be applied after the hull has been washed and scrubbed with a stiff broom. A mixture of creosote and paris green has been recommended as a repellent, but yacht builders declare there's nothing quite so effective as powdered copper in solution.

Boston and New England interests occasionanly send large schooners into the tropics to engage in freighting or fishing. Barely are these vessels coppered unless they were built especially for the trade and calculated to visit ports where hauling out facilities are inadequate. Such schooners are protected at a cost of from $500 to $800, according to size, but they do not have to go on railways or into drydock, except for patching or calking. The initial expense is great and question arises whether it is sound business logic.

Not one in 100 coasters plying between New England and ports in South Carolina, Georgia and Florida, or even in the Gulf of Mexico, are coppered, though their trade, principally lumber freighting, takes them where the teredo has ample opportunity to riddle planking. These coasters haul out once a year for repainting and nearly a ton of barnacles has been scraped from a bottom that had not been overhauled for two years, yet the teredo had not caused heavy damage. Most of the squareriggers of wood construction, however, that roam the seas in quest of charters are protected by copper sheathing.

G. S. H., Boston, Mass.



This steel motor yacht from the boards of Whittelsey & Whittelsey will be driven at a speed of 18 miles per hour by twin screws. Her arrangement is similar to that of Itasca II, whose designs have been published previously.

New Motor Boat Designs.

A Steel Motor Yacht.

THE craft shown upon the preceding page has been designed lately for a Western yachtsman and is to be built of steel with mahogany deck erections. She is 134 feet over all with a 16-foot beam.

The plans are from the boards of Whittelsey & Whittelsey, of New York City, and indicate a long, clean type of the modern gasoline vessel, in which a large deck space is sought, and the deck houses kept as simple and as low as possible.

The boat will have a speed of eighteen miles per hour and will be driven by twin-screw motors, giving a total horsepower of 600.

The dining saloon is located forward, and is in solid African mahogany, followed by the bridge, which is of good size. The galley and pantry are below these quarters, which makes a convenient arrangement for serving.

The crew's quarters are forward of the pantry and ample for the purpose. The machinery is located in the middle body of the boat and is followed by the gasoline tank compartment. This compartment has transverse bulkheads on the fore and aft sides and a short fore and aft bulkhead which entirely encloses the gasoline tanks.

Aft of the gasoline tank compartment is located the owner's stateroom. This arrangement is similar to that in the Itasca II, which worked out to such great satisfaction.

Abaft of the owner's stateroom is a small after saloon into which the companionway from the deck enters. This after saloon will be used as a breakfast room in stormy weather.

Abaft of this latter space are located three wing staterooms with double berths in each; also, a guest's bathroom and a guest's toilet, and a double stateroom. These rooms are all intercommunicating.

The owner's quarters below deck will be in cream enamel, with solid African mahogany panel doors, bureaus, transom fronts and trim.

The boat is divided into seven watertight compartments by transverse watertight bulkheads, and it is the intention of the designers to shift the arrangements sufficient in the owner's quarters to put another watertight bulkhead in them. With this additional bulkhead, it is estimated that the vessel will be safe with any compartment flooded.

The electric light plant will be complete in all respects and the entire furnishings will be in keeping with the vessel.

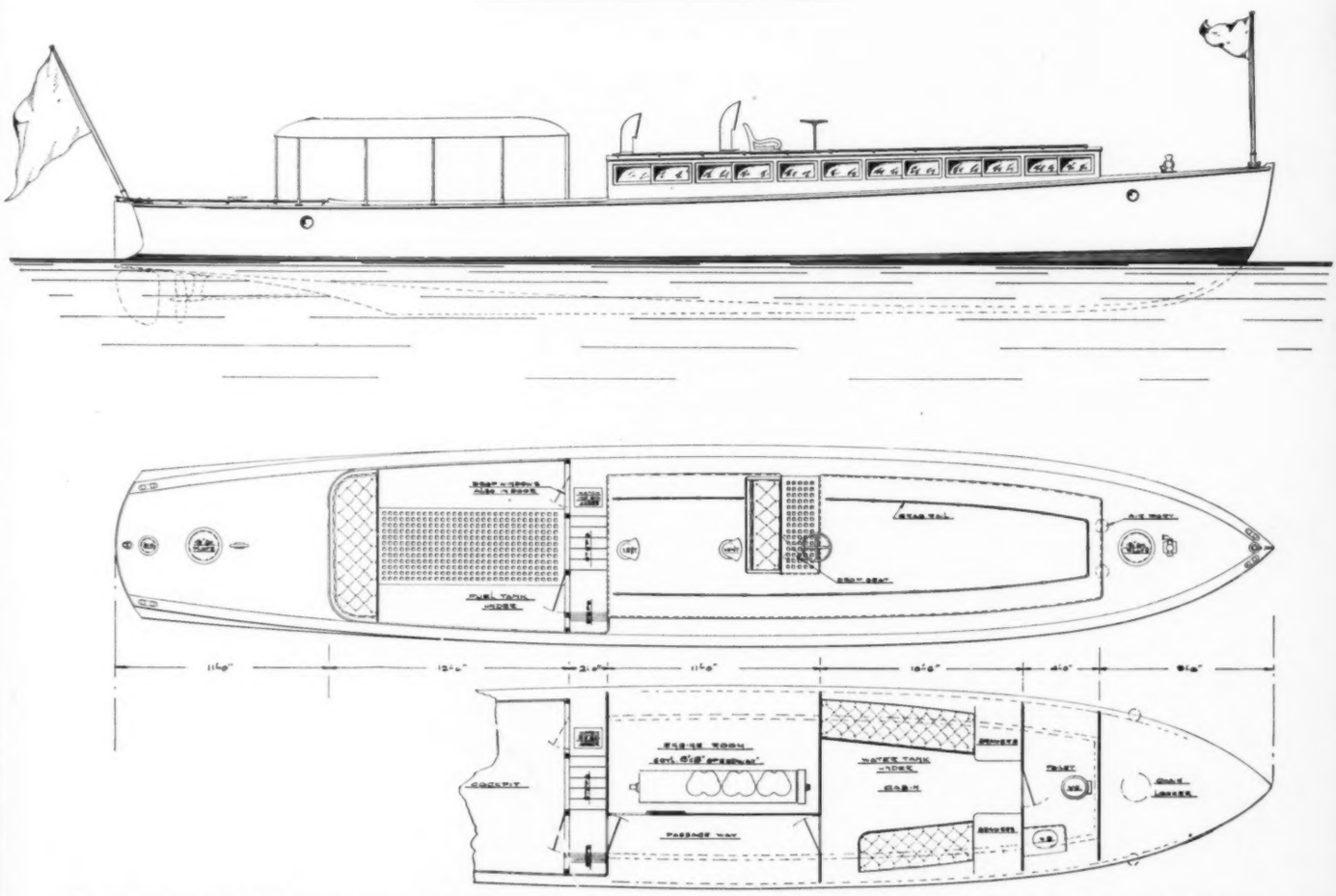
The craft is provided with two stacks, with one mast between. The stacks are low and broad, and combine with the lines of the boat to give a general idea of speed. The bridge, which is just forward of the stacks, is covered by an awning, but this cover does not extend above the height of the stack.

At the after end there is considerable deck space, being free and open, with the exception of the two skylights shown, as far forward as the low trunk cabin. Upon either side of the cabin, however, is a wide passage around the deck so that the entire space is available.

A pleasant feature of this boat is the manner in which the owner's and guests' quarters are entirely separated from the motor room, galley and crew's quarters. Being protected by watertight bulkheads and having separate entrances, there is no need for the guests to come in contact with the operating sections of the boat. The crew's quarters are entered through a companionway forward of the deck house, and the other quarters are entered through a companionway at the after end of the main cabin. The forward deck house, which is used as a dining saloon, is lighted through Pullman windows and the after cabin, as well as the space below decks, is lighted by port holes.

In designing the form, seaworthiness is being carefully looked out for, and while a good speed is desired, it is not considered necessary to detract from the ideal seagoing boat.

The result will be a high-speed cruiser capable of navigating the inland waterways or of putting out to sea for a considerable distance, as the owner desires.



This 60-ft. boat for Mr. Bourne has a guaranteed speed of 22 miles per hour and is adapted mainly to day service. She carries 200 h.p.

"Ahkoond of Swat," A Cruiser.

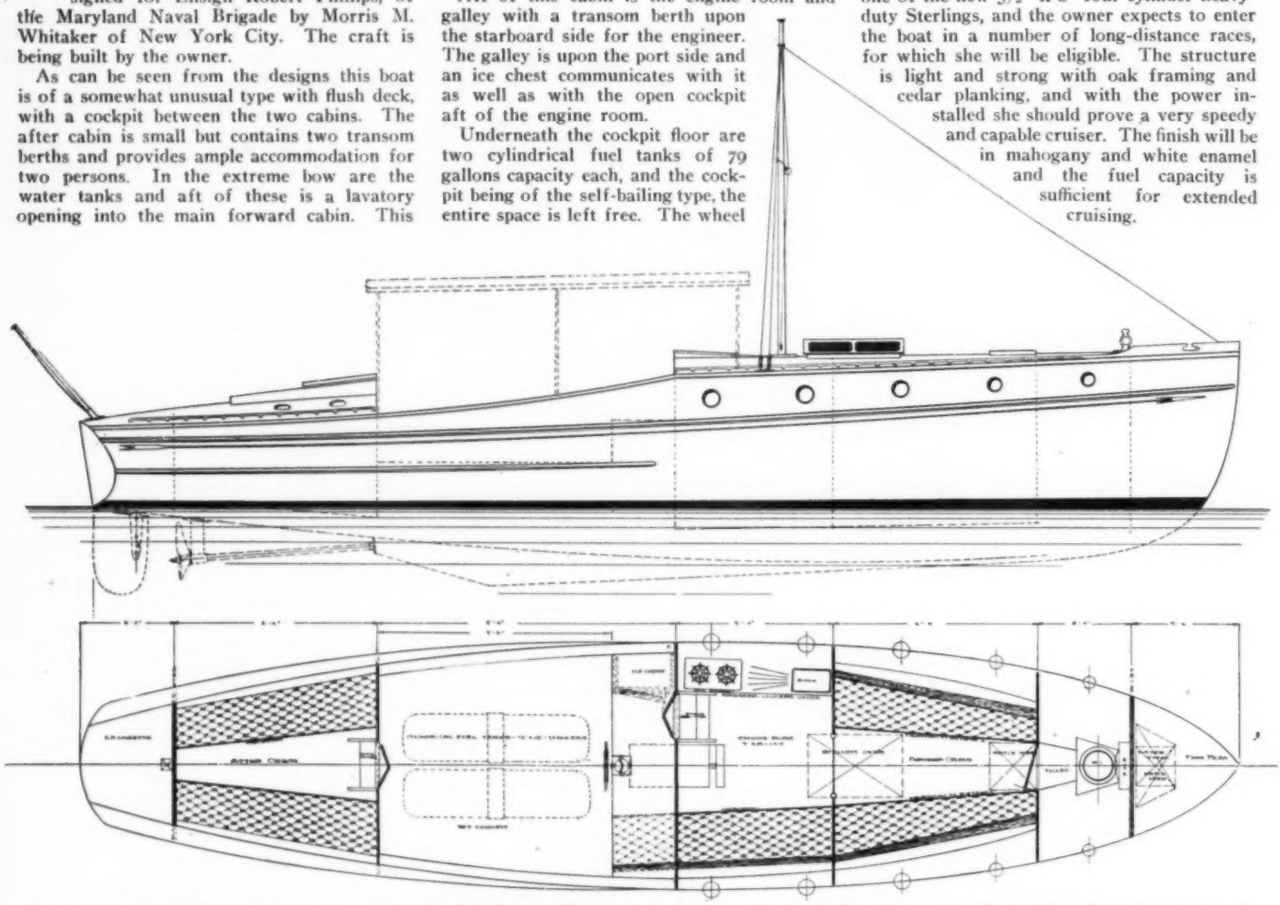
THE craft shown in the design below is a double cabin raised deck cruiser, designed for Ensign Robert Phillips, of the Maryland Naval Brigade by Morris M. Whitaker of New York City. The craft is being built by the owner.

As can be seen from the designs this boat is of a somewhat unusual type with flush deck, with a cockpit between the two cabins. The after cabin is small but contains two transom berths and provides ample accommodation for two persons. In the extreme bow are the water tanks and aft of these is a lavatory opening into the main forward cabin. This cabin contains two extension transoms and can comfortably sleep four people.

Aft of this cabin is the engine room and galley with a transom berth upon the starboard side for the engineer. The galley is upon the port side and an ice chest communicates with it as well as with the open cockpit aft of the engine room.

Underneath the cockpit floor are two cylindrical fuel tanks of 79 gallons capacity each, and the cockpit being of the self-bailing type, the entire space is left free. The wheel is located amidships where the view is clear.

The motor equipment of this vessel will be one of the new 5½" x 8" four-cylinder heavy-duty Sterlings, and the owner expects to enter the boat in a number of long-distance races, for which she will be eligible. The structure is light and strong with oak framing and cedar planking, and with the power installed she should prove a very speedy and capable cruiser. The finish will be in mahogany and white enamel and the fuel capacity is sufficient for extended cruising.



A new raised-deck cruiser for an ensign in the Maryland Naval Brigade. She is eligible for many of the long-distance races and will without doubt be entered in several.

A Fast Sixty-Foot Day Cruiser.

THE Gas Engine & Power Co. and Chas. L. Seabury & Co., Cons., of Morris Heights, New York, have just taken an order for the construction of an interesting craft for F. D. Bourne, of the New York Yacht Club. This vessel is novel in many particulars, as the tracings upon page 25 will show. The boat is 60 feet in length with a beam of 10 feet 6 inches and has a guaranteed speed of 22 miles per hour.. Although she is adapted mainly to day service, she has comfortable cabin accommodations and could be used in an emergency by a selected party for extensive trips.

The construction of this craft is in accordance with the usual plans of the company, the stem, keel and frames being of oak and the planking of white cedar, copper-fastened and riveted throughout. All of the outside joiner work is of mahogany and the cabin windows are unusually large and arranged to slide fore and aft.

Forward is a chain locker with an 18-inch deck plate and next to this is a small winch for raising the anchor. Opening from the forward end of the cabin is a toilet room extending the full width of the vessel. The cabin is equipped with seats and lockers on each side with a set of drawers at the forward end. A large seat extends the length of this room upon the port side and upon the starboard side the seat is short to allow access through a passageway to the after cockpit.

The engine room is located amidships and the motor equipment consists of a six-cylinder 8" x 8" Speedway motor of 200 horsepower. The entrance to the cockpit from this cabin is by means of a short flight of steps, under which is an icebox.

The cockpit has a latticed floor with fuel tanks under it and a comfortable seat is arranged at the after end the full width of the boat. The doors leading into the cockpit are provided with drop-windows. The cockpit is unusually large, with a glass bulkhead at the forward end.

It will be noticed from the dotted lines in the drawing that the after under body of this craft is cut away allowing the stern to lie almost flat upon the water which not only adds to her speed under normal conditions, but assists greatly in her ability to answer the helm at high speed.

She is of novel construction throughout and is built upon speedy lines. There is nothing to offer appreciable wind resistance, both the cabin and the cockpit awnings being low and the stern, which is of the V-transom type, will offer practically no resistance to the water by drawing down when under way.

There is a large deck plate upon the after deck and removable bulkheads communicating with the cockpit allow ample storage space in this part of the boat. A similar deck plate in the forward deck opens to the chain locker to which access may also be gained from within.

The trunk cabin section of the boat extends well to the midship portion and is fitted with a grab rail along the edge to permit passage way along the entire length of the boat by the side of the trunk cabin. Two air ports are fitted to the forward section of the trunk cabin, so that good ventilation may be obtained even in stormy weather without opening any of the windows.

Two additional ventilators supply fresh air to the motor room which is at the after end of the trunk cabin. A space is left for a passage way extending from the forward cabin to the cockpit aft.

The craft is steered from a bridge deck over the cabin with a vertical wheel just forward of a seat which is set into the cabin roof and extends a trifle more than half the width of the cabin. The boat will be lighted throughout with electricity and contains all the up-to-date features of this type of craft.

Commodore Bourne expects to have the vessel ready for spring delivery and she will be used principally at his summer home on the St. Lawrence. She is of sufficiently shallow draft to navigate the canals and can cruise to the St. Lawrence by the inland route.

A Twin-Screw Ocean Racer.

THE accompanying plans show a 60-foot cruiser from the board of J. Murray Watts, naval architect, of Philadelphia, for a Tacoma yachtsman. The owner's requirements called for a sea-worthy type of vessel, suitable for the rough waters of the Pacific, and as it was intended that the boat should take extended trips along the coast of Alaska, a pilot house was required, from which the boat could be controlled in bad weather, while there was a steering position on the bridge deck for summer use.

The most noticeable feature of the design is the very large stateroom for the owner. This room is 14 feet long by 11 feet wide, with a dressing-room and toilet communicating. It is reached from the chart house by means of steps leading into a lobby which also has access to the toilet room. The chart house is fitted up to make a comfortable saloon with sofas 2 feet wide on either side, making a very pleasant lounging place in bad weather.

The floor of this chart house is sunken to form a well 4 feet wide and 6 feet 6 inches long, which comes down right over the double bed in the stateroom and leaves plenty of headroom all around. This well is supported by the four posts of the double bed in the stateroom, and is concealed by a chintz canopy, matching the other hangings of the stateroom, which is finished in Colonial style.

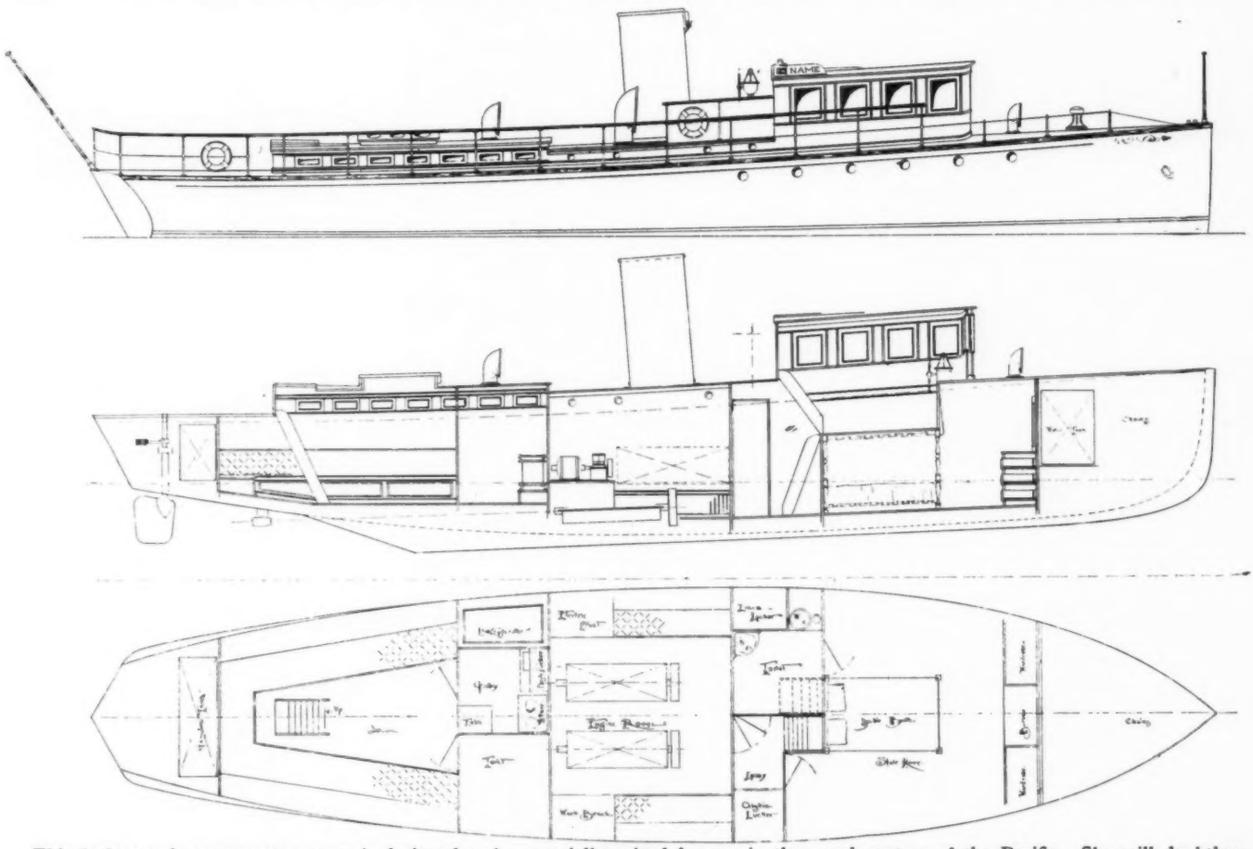
The after quarters consist of a large dining saloon with wide sofa transoms so arranged that four bachelor guests could be taken for a cruise and given comfortable sleeping accommodations in this room. There is a folding table fitted which can be stowed away after meal times. A commodious galley has access to this saloon.

On the port side is a dressing-room and toilet. Amidships is the engine room, ventilated by a large stack, in which are installed two heavy-duty 4-cylinder 4-cycle engines, a separate electric power plant and a workbench. There are two transoms for the crew at the side of the engine room, and two pipe berths, so that four men can be carried in an emergency.

The dimensions of this boat are 60 feet over all, 14 feet beam and 3 feet, 11 inches draft. With two 35 h. p. engines she is expected to develop a speed of 14 miles.

The general appearance of this craft is very similar to the successful Havana racer Caliph, and is an improvement on Corsair, which was built for Commodore Jacobs, of Tacoma, and designed when Mr. Bowes was in partnership with Mr. Watts.

The outside joiner work will be simple and strongly finished in solid teak and the interior in mahogany, except the galley and toilets, which will be finished in white enamel. The engine room will be in varnished pine.



This 60-foot twin-screw ocean racer is designed to be especially suited for use in the rough waters of the Pacific. She will doubtless cruise to Alaska.

A 77-Foot Clipper Bow Yacht.

UPON the following page are shown the designs of a yacht which at first glance and even after a study of the profile, would appear to be a modern steam yacht having a conventional clipper bow, overhanging stern, continuous deck house, pole, mast and stack. Her dimensions are: length over all, 77 feet; waterline, 67 feet; beam, 14 feet; draft, 4 feet.

The motor power will consist of one 6-cylinder motor of 100 h. p., which will give the yacht a cruising speed of 13 knots. This motor, with the fuel tanks and electric light plant, is placed in the center of the yacht in a compartment enclosed from the rest of the vessel by watertight bulkheads fore and aft.

The plans show a yacht of moderate ends, which are neatly turned and present a good appearance. Associated with a pronounced flare forward the craft is elegant in appearance.

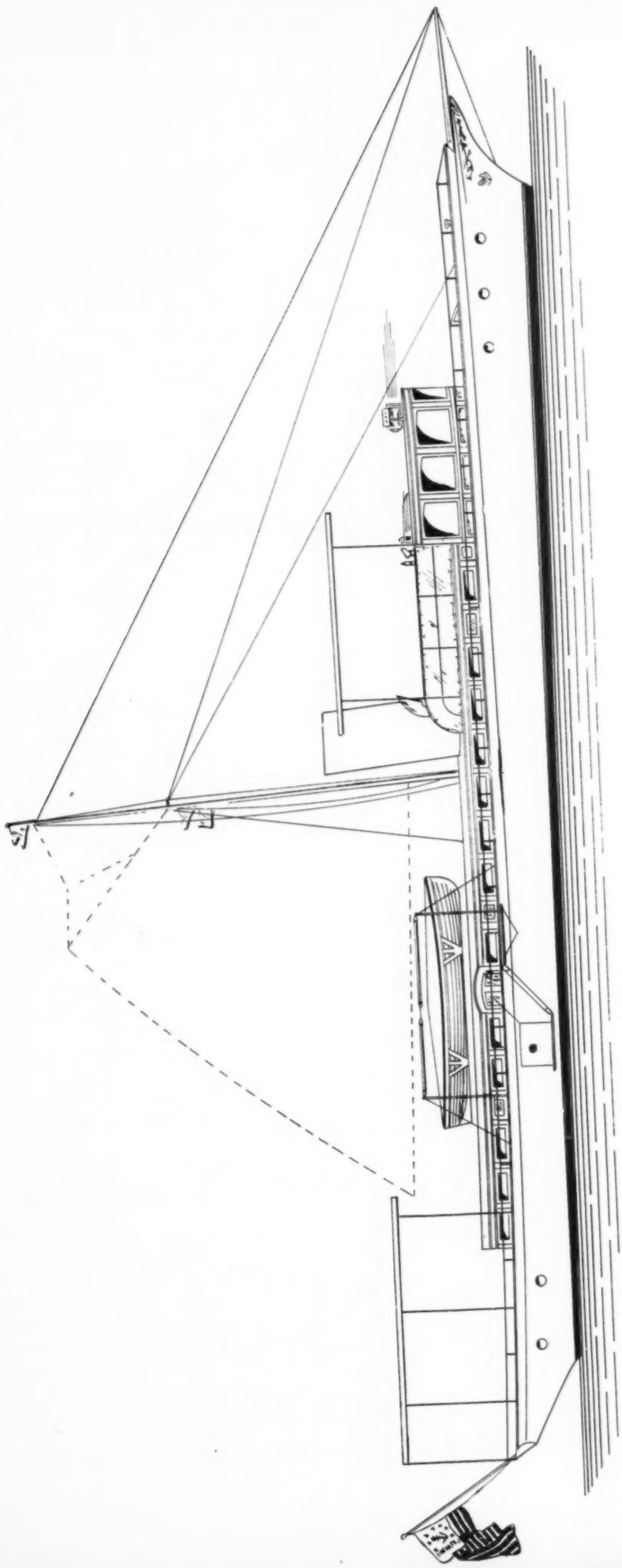
The forward part of this deck house contains a dining saloon, which directly communicates with the galley.

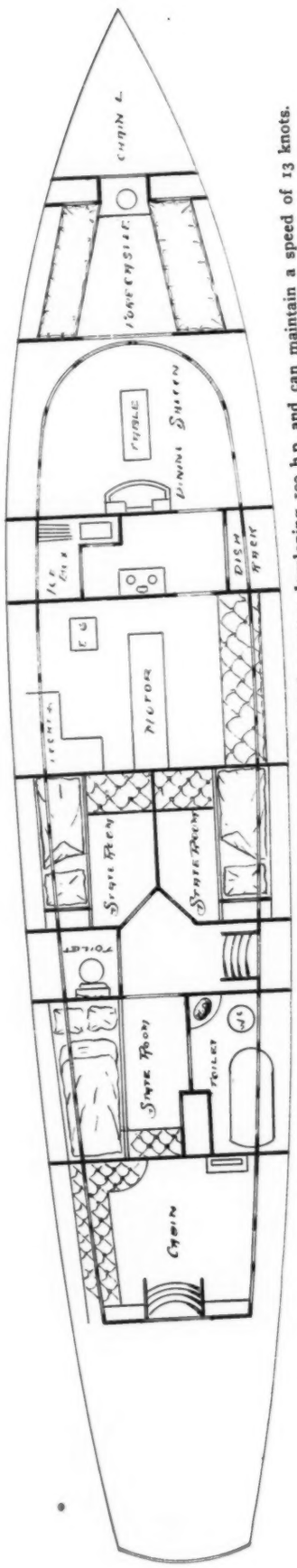
Aft of the motor room are two staterooms fitted with berths, linen lockers, upholstered seats and a toilet; these staterooms, as well as the owner's stateroom, are reached through a staircase entered at the port side of the deck house.

The owner's stateroom is fitted with double berths, wardrobe, upholstered seat, linen closet, toilet, wash basin and bath; next aft comes a drawing room, fitted with a lounge, two cabinets, a desk, a Pullman berth, table and chairs, enclosed with a pipe railing and awning. The steering is done from a large bridge deck aft of the dining saloon, which is fitted with a steering wheel, binnacle, wicker chairs and a settee.

The deck is furnished with all the necessary hardware, a 14-foot motor dinghy and a 12-foot rowboat.

This craft has been designed by the Reliance Motor Boat Company, of New York City.





A 77-ft. yacht designed by the Reliance Motor Boat Company. She is driven by a six-cylinder motor developing 100 h.p. and can maintain a speed of 13 knots.
A description will be found upon the preceding page.

A Reliance Yacht With Unusual Accommodation.

THE Reliance Motor Boat Company, of New York City, have designed another interesting cruising yacht, the plans of which are shown below. The craft is an exceptionally handsome one and shows some original ideas in her construction. She is a very able and seaworthy vessel, which would answer either as a first-class hunting or a cruising yacht. The finish throughout is of the Reliance standard and her dimensions are as follows: Length over all, 52 feet, 11 inches; beam, 11 feet.

The head room in the cabin is over 6 feet clear. The general arrangement of the interior is shown in the plans. Forward is a water tank of sufficient size to supply both toilets and galley.

Next aft there is a chain locker, and aft of this is a toilet 4 feet in length, fitted with lockers, Sands' toilet, wash basin and a shower bath. This is directly connected with the owner's stateroom, which is furnished with one double berth, two linen lockers, two wardrobes, one of which is for the use of oilskins; a bookcase, a medicine cabinet, bureau dresser and one upholstered settee; this room is entered from the bridge deck.

Next aft is the engine room, which is of ample size to provide accommodations for both engineer and captain. This is fitted with two motors of 46 h. p. each, and electric generator and a toilet; aft of this is a commodious dining saloon, which is entered from the deck by a staircase in the after bulkhead and fitted with two Pullman berths, two large lockers, one extension table, a bookcase, desk, toilet, sideboard, two cabinets, gun and fishing racks and a galley. The latter is equipped with a large ice box, dish rack, sink and one Shipmate range. Under the after deck are fuel tanks of sufficient capacity to allow her to run many miles without making port to replenish her fuel supply.

On deck she is equipped with everything for the comfort of the owner and his guests; the after deck is entirely given up for the use of wicker chairs and enclosed with a pipe railing. A standing awning is provided above both decks, and on the cabin roof is carried a 14-foot motor dinghy and one signal mast. From the bridge deck, which is fitted with the steering wheel, telegraph, upholstered seat and binnacle, the entire boat is controlled.

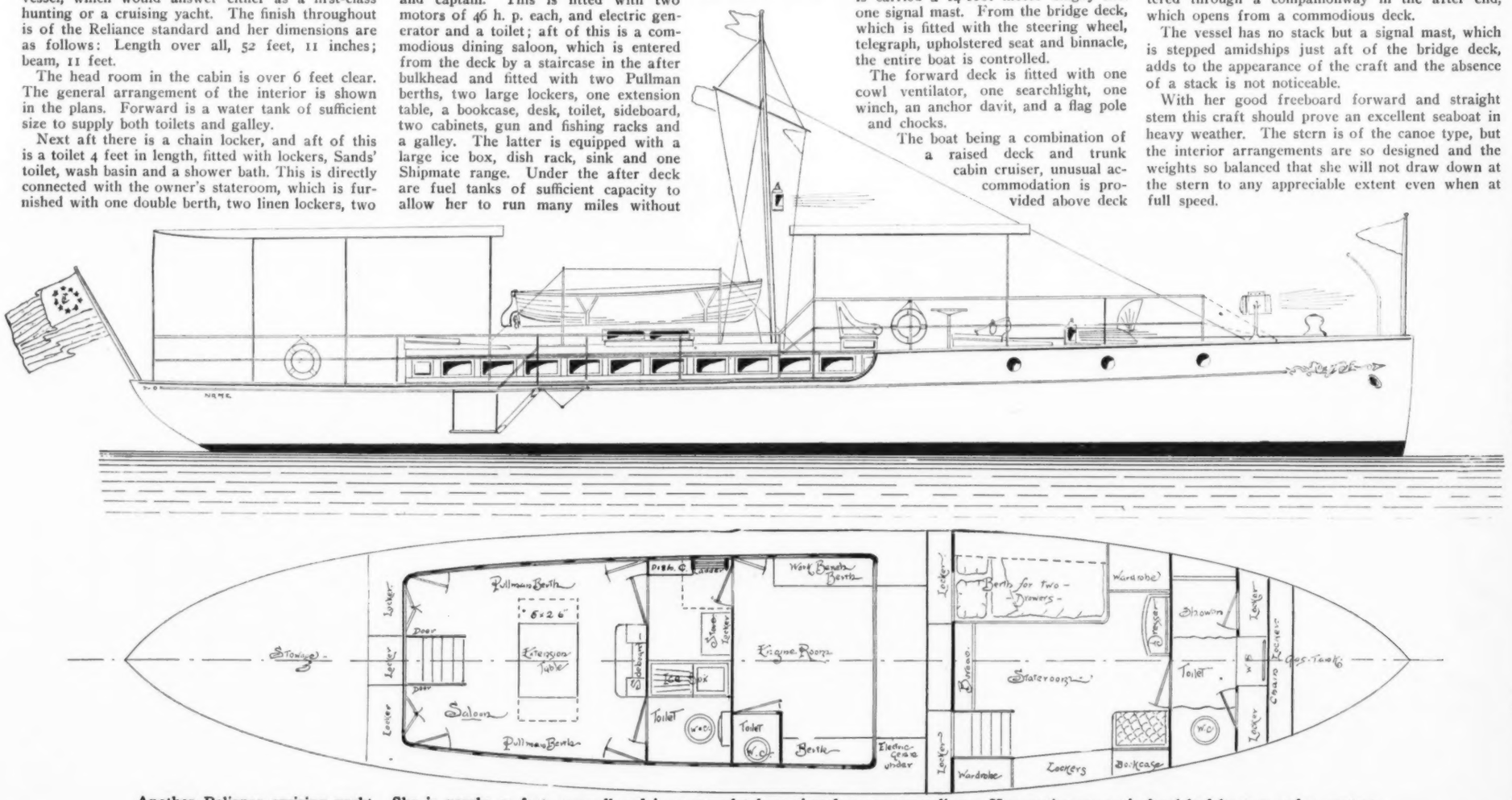
The forward deck is fitted with one cowl ventilator, one searchlight, one winch, an anchor davit, and a flag pole and chocks.

The boat being a combination of a raised deck and trunk cabin cruiser, unusual accommodation is provided above deck as well as below. The seat aft the wheel upon the bridge is a very comfortable one and is sufficiently roomy to seat several persons in comfort.

The entire after section of the vessel is lighted by Pullman windows in the sides of the trunk cabin and by a skylight in the deck. This cabin is entered through a companionway in the after end, which opens from a commodious deck.

The vessel has no stack but a signal mast, which is stepped amidships just aft of the bridge deck, adds to the appearance of the craft and the absence of a stack is not noticeable.

With her good freeboard forward and straight stem this craft should prove an excellent seaboat in heavy weather. The stern is of the canoe type, but the interior arrangements are so designed and the weights so balanced that she will not draw down at the stern to any appreciable extent even when at full speed.



Another Reliance cruising yacht. She is nearly 53 feet over all and is as completely equipped as an ocean liner. Her motive power is furnished by two 40-h.p. motors.

A 45-Foot Cruising Yacht.

THE accompanying plans of the 45-foot cruiser below are from the boards of W. E. Anderson, of Albuquerque, New Mexico. The boat has been designed for an Eastern yachtsman, the profile and arrangement plan being laid out in accordance with the owner's wishes.

The owner's stateroom is forward under the raised deck and contains two stationary berths and a dresser. Aft of this stateroom is a toilet fitted with a closet and lavatory. Entrance to this compartment is by a sliding door from the lobby. Across from the toilet is a stairway leading to the bridge deck above, from which point the boat will be entirely controlled.

Next aft comes the engine room containing a 25 h.p. heavy-duty Standard motor, which will give the boat a speed of 10 miles per hour. In this compartment is a work-bench, a locker for the engineer and a locker seat with a pipe berth above. Next to this is a galley of ample size, fitted with a No. 2 Shipmate coal range, sink, dish-rack, and a good-sized refrigerator.

Aft of this is the main cabin or saloon containing two transom berths with extensions, and a dresser. Aft of this compartment is the after deck which will accommodate five or six wicker chairs. Under this deck are installed the gasoline tanks. An awning covers both the bridge deck and the deck aft of the stack.

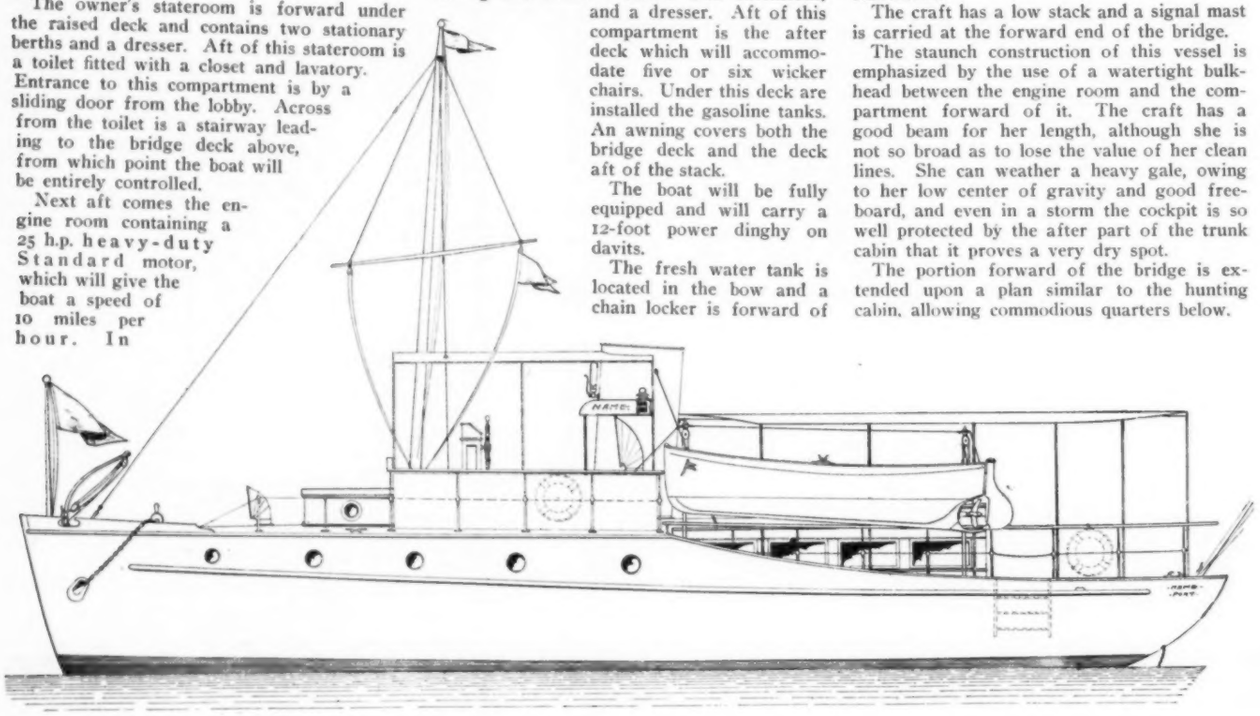
The boat will be fully equipped and will carry a 12-foot power dinghy on davits.

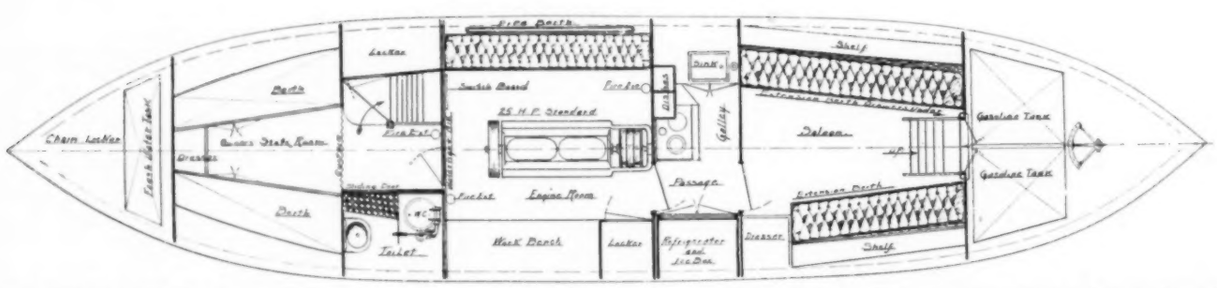
The fresh water tank is located in the bow and a chain locker is forward of this. The vessel is very commodious for one of her type, the combination of raised deck and trunk cabin permitting excellent accommodations below decks. The bridge is well protected by a railing and canvas, and it is covered by a removable canvas awning upon stanchions.

The craft has a low stack and a signal mast is carried at the forward end of the bridge.

The staunch construction of this vessel is emphasized by the use of a watertight bulkhead between the engine room and the compartment forward of it. The craft has a good beam for her length, although she is not so broad as to lose the value of her clean lines. She can weather a heavy gale, owing to her low center of gravity and good freeboard, and even in a storm the cockpit is so well protected by the after part of the trunk cabin that it proves a very dry spot.

The portion forward of the bridge is extended upon a plan similar to the hunting cabin, allowing commodious quarters below.





This cruiser by W. E. Anderson has been laid out in accordance with the owner's wishes and contains an unusually complete equipment. She is being built for an Eastern yachtsman.

A 40-Foot Freight Boat.

UPON page 31 are shown the designs of an interesting 40-footer, designed by C. S. Nielsen, of Brooklyn, New York City, which is intended to carry a large sail area in addition to her power equipment. The keel and stem are of white oak and the outside planking is of yellow pine. The ceiling inside is also of yellow pine. The vessel is provided with a watertight bulkhead at the forward end of the engine room made of two-inch spruce and sheeted with galvanized iron plates on the engine room side of the bulkhead.

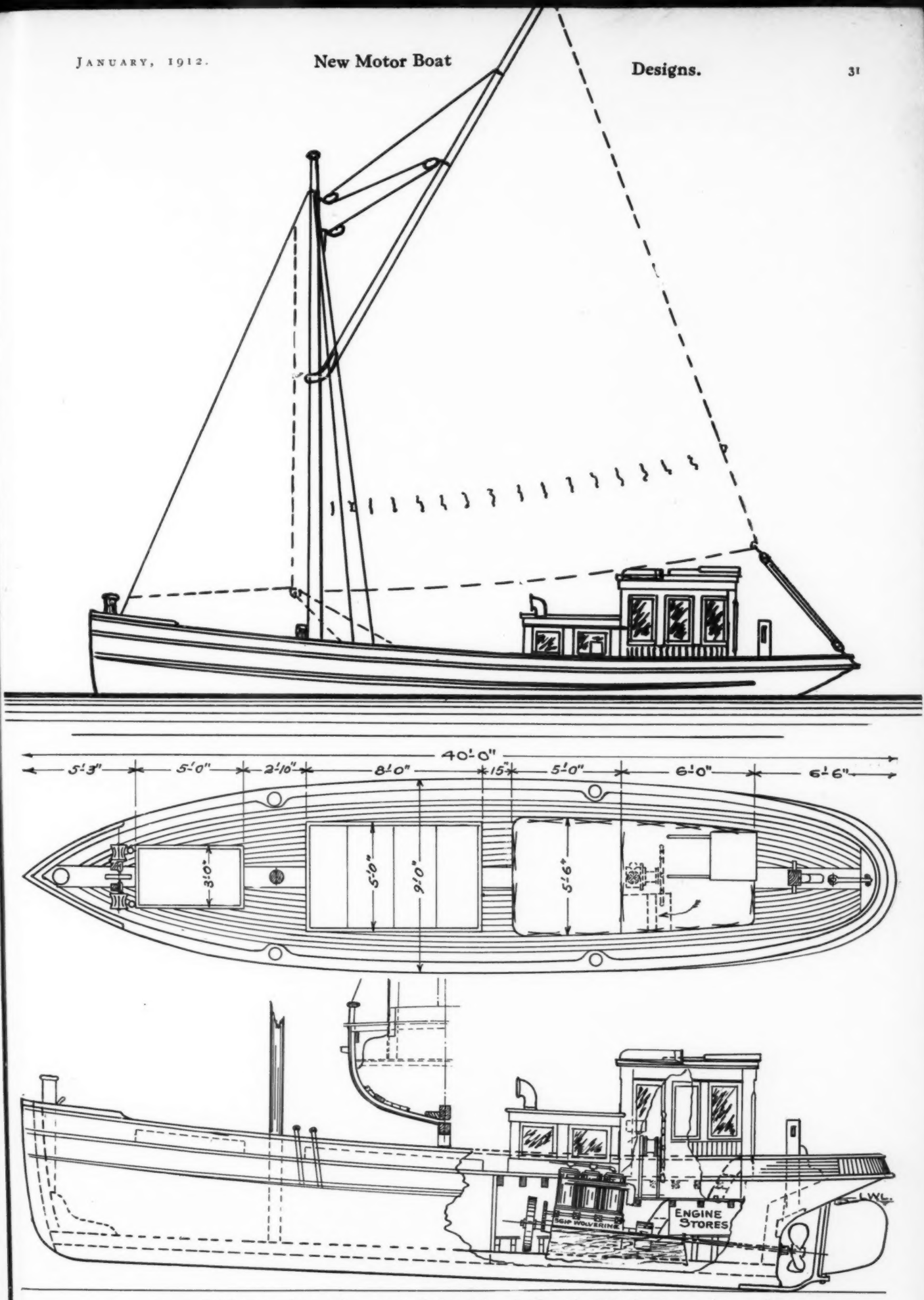
The boat will be used for carrying freight and for towing purposes, and for the latter purpose there are six heavy towing bitts located, one forward, one aft and four at the midship section. These bitts are all of heavy oak and are set through into the keel.

The framing is of white oak, 3" x 3", spaced 12 inches from center to center and steam bent. All the deck planking is 2" x 3" yellow pine and the deck house, which is also a pilot house, is of the portable type. This house is finished in oak and the roof outside is covered with canvas. In the pilot house are nine plate-glass windows, and a small extension is provided forward of this to cover the engine. This extension house has six plate-glass windows.

The wheel is a 30-inch mahogany one and plenty of locker space is provided for the use of the helmsman. At the after end of the powerhouse upon the starboard side is a companion hatch leading to the after deck.

The sail plans include a mainsail and one staysail, as shown upon the drawing, the mast being made from Oregon pine, 30 feet high and 8 inches in diameter at the deck. The gaff is also of Oregon pine, 6 inches in diameter at the center and tapering at both ends to a 4-inch diameter. This gaff appears to be somewhat heavy but it will be used more as a cargo boom than as a sailing spar and will prove very useful for this purpose.

The vessel is equipped with a 36-horsepower Wolverine motor of the heavy-duty type, although the freeboard of the craft is somewhat low. She is sufficiently high in the bow to withstand heavy seas and she should prove exceptionally staunch for rough-water towing.



A 40-ft. freight boat with a 36-h.p. motor. A description of this craft will be found upon the preceding page.

A Fast Runabout for Four People.

THE requirements for the craft shown below, designed by H. B. Pickering & Co., of Ann Arbor, Mich., were that the boat should be seaworthy and fast in protected waters, capable of seating four with comfort, aside from a paid driver, must have some sort of a cabin shelter and finally must be of unique and striking design.

The idea was to get a boat that could be used for afternoon calling and in the evening to take theater parties to town. While the design is a distinct departure, it must be admitted that the result is all that was required and should please the most fastidious.

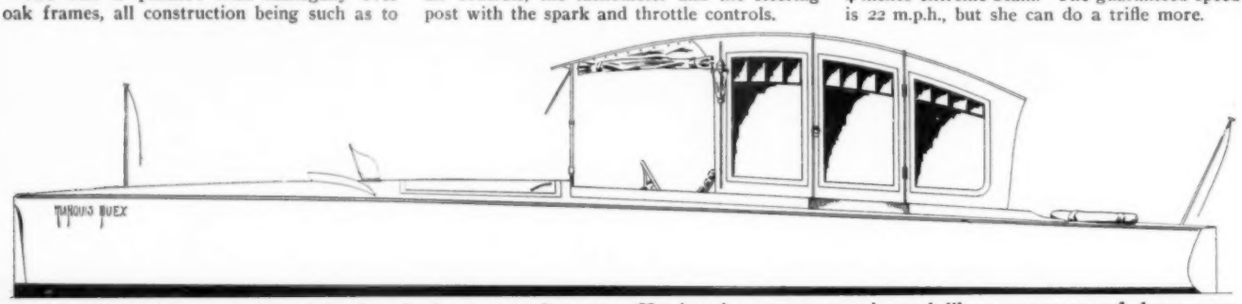
The hull is planked with mahogany over oak frames, all construction being such as to do away with increased weight, by a system of trussing. There are two bulkheads, one foreward and one aft. The gasoline tank is placed under the driver's seat and is kept under pressure. The deck is of mahogany, as is also the sternboard, coaming and breakwater.

The 50 h.p. engine under the hinged hatch is mounted on bearers, which in turn are fastened to the long keelsons, which notch over web frames at both ends of the engine. The lighting system is a dynamo run by the motor, and storage batteries, with the switchboard mounted on the bulkhead in front of the driver. Here also are located the compressed air controls, the tachometer and the steering post with the spark and throttle controls.

The cabin is of pressed aluminum, being set inside of the coaming and supported by light angle iron. There are two wide cross-seats in the cabin; the center window opens out in one piece from coaming to cabin top, while the top folds back to provide an easy entrance. In the space between the seats there is full 6 feet of headroom.

The driver's seat forward is protected by side storm curtains and a heavy folding glass windshield. The cabin windows below the leaded panels drop into pockets, the forward plate-glass partition alone remaining fixed.

The hull is 28 feet over all and with 5 feet 4 inches extreme beam. The guaranteed speed is 22 m.p.h., but she can do a trifle more.



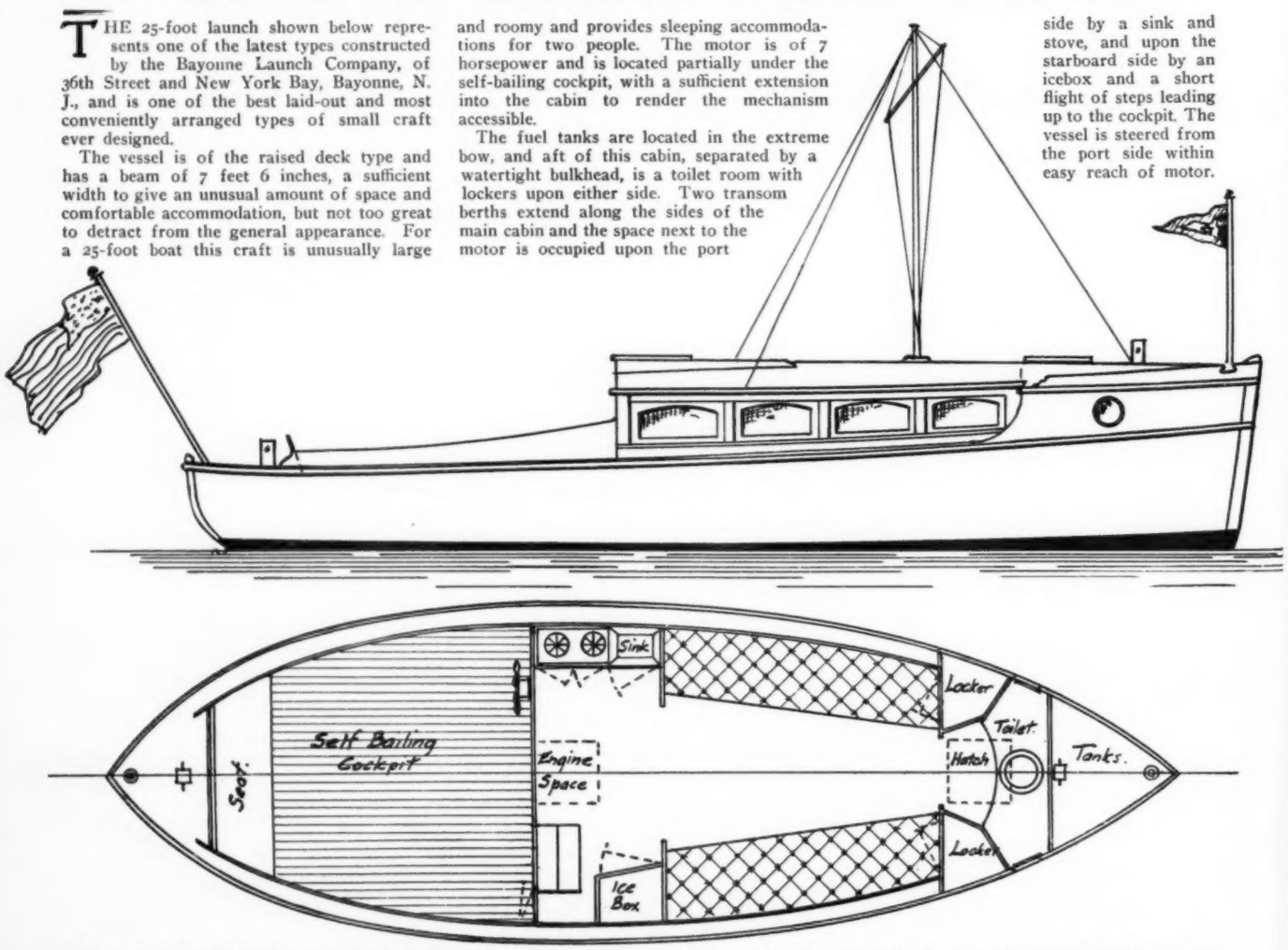
A seaworthy and fast boat intended primarily for protected waters. Her interior arrangement is much like a motor car and shows some novel ideas.

A 25-Foot Raised Deck Cruiser.

THE 25-foot launch shown below represents one of the latest types constructed by the Bayonne Launch Company, of 36th Street and New York Bay, Bayonne, N. J., and is one of the best laid-out and most conveniently arranged types of small craft ever designed.

The vessel is of the raised deck type and has a beam of 7 feet 6 inches, a sufficient width to give an unusual amount of space and comfortable accommodation, but not too great to detract from the general appearance. For a 25-foot boat this craft is unusually large and roomy and provides sleeping accommodations for two people. The motor is of 7 horsepower and is located partially under the self-bailing cockpit, with a sufficient extension into the cabin to render the mechanism accessible.

The fuel tanks are located in the extreme bow, and aft of this cabin, separated by a watertight bulkhead, is a toilet room with lockers upon either side. Two transom berths extend along the sides of the main cabin and the space next to the motor is occupied upon the port side by a sink and stove, and upon the starboard side by an icebox and a short flight of steps leading up to the cockpit. The vessel is steered from the port side within easy reach of motor.



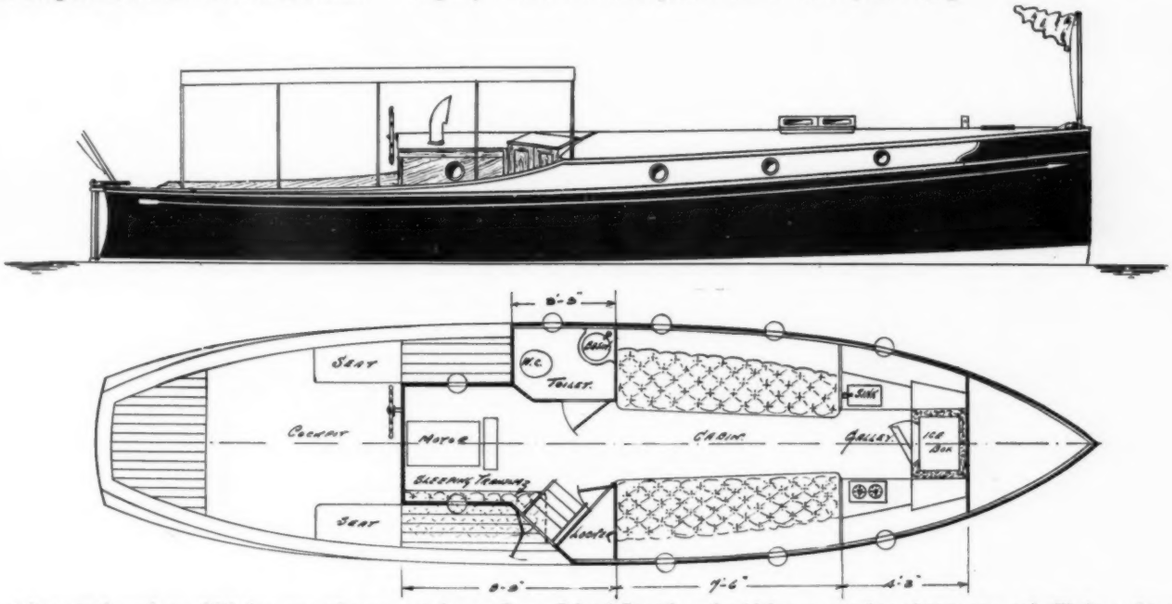
This 25-foot cruiser built by the Bayonne Launch Company carries only 7 h.p., but she can maintain a good average cruising speed.

Sentinel, a Thirty-six-Footer.

A POPULAR type of cruiser which was built last summer by the Lüders Marine Construction Company, of Port Chester, N. Y., is shown in the drawings below. This particular craft, Sentinel, is owned by Robt. M. Lyman, of Rye, N. Y., and has been used upon Long Island Sound in all sorts of weather and has proved herself a very capable cruiser.

She is of a stock model, but by reason of her comparatively small size, is quite out of the ordinary type of raised deck cruiser, affording as she does with privacy accommodation in the cabin for four people.

A galley is in the forward portion and a toilet room at the port side opens from the cabin amidships. The motor is just forward of the cockpit, the power consisting of a Craig engine which will drive the boat at about 8½ miles per hour, with a cruising radius of 400 miles. An open cockpit is provided aft covered by an awning.



A 36-foot stock cruiser which has proved very popular on Long Island Sound, and which can weather almost any gale likely to be encountered in those waters.

A Fifty-Foot Cruiser.

BELOW are shown the designs of a cruiser from the boards of the Atkin-Wheeler Company, of Huntington, Long Island, N. Y. She has a length over all of 50 feet, a beam of 11 feet and a draft of 3 feet 6 inches. The keel is of yellow pine, with frames of white oak. The deck houses, rails and waterways are of mahogany and all fittings are polished bronze. The forward cabin, which has a headroom of 7 feet, opens into a toilet room forward, and aft through a passage into the engine room.

The main cabin, which has a headroom of 6 feet 2 inches, is aft and a storeroom opens from this. Another toilet is upon the port side of the vessel communicating with the main cabin. This cabin is also equipped with berths.

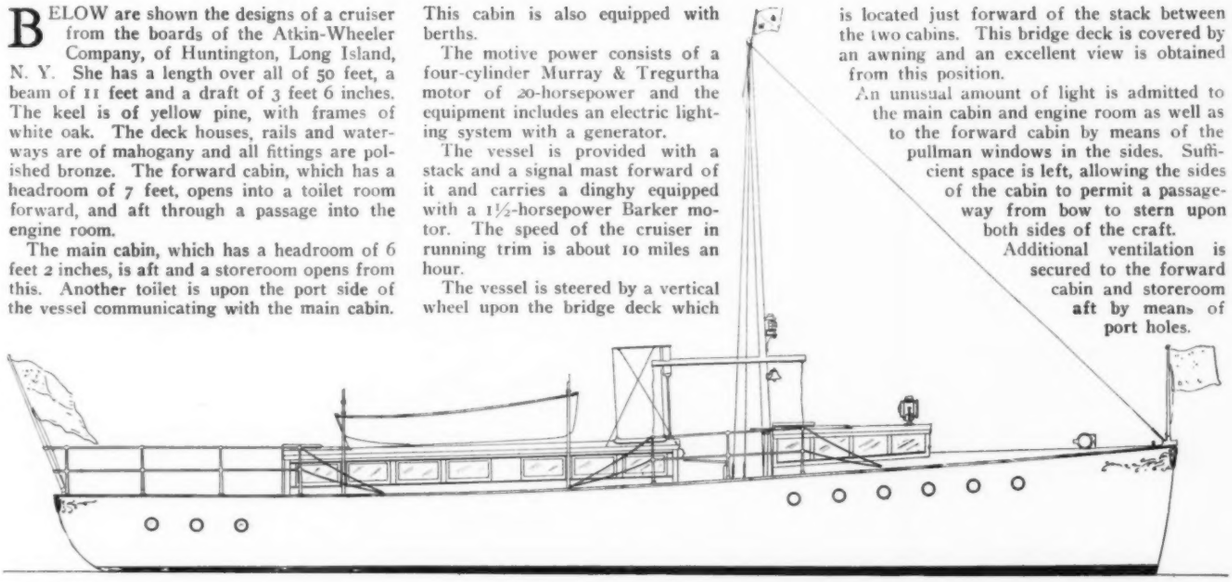
The motive power consists of a four-cylinder Murray & Tregurtha motor of 20-horsepower and the equipment includes an electric lighting system with a generator.

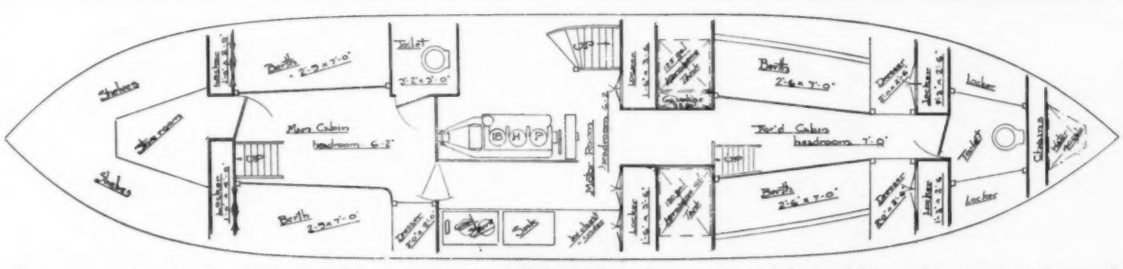
The vessel is provided with a stack and a signal mast forward of it and carries a dinghy equipped with a 1½-horsepower Barker motor. The speed of the cruiser in running trim is about 10 miles an hour.

The vessel is steered by a vertical wheel upon the bridge deck which is located just forward of the stack between the two cabins. This bridge deck is covered by an awning and an excellent view is obtained from this position.

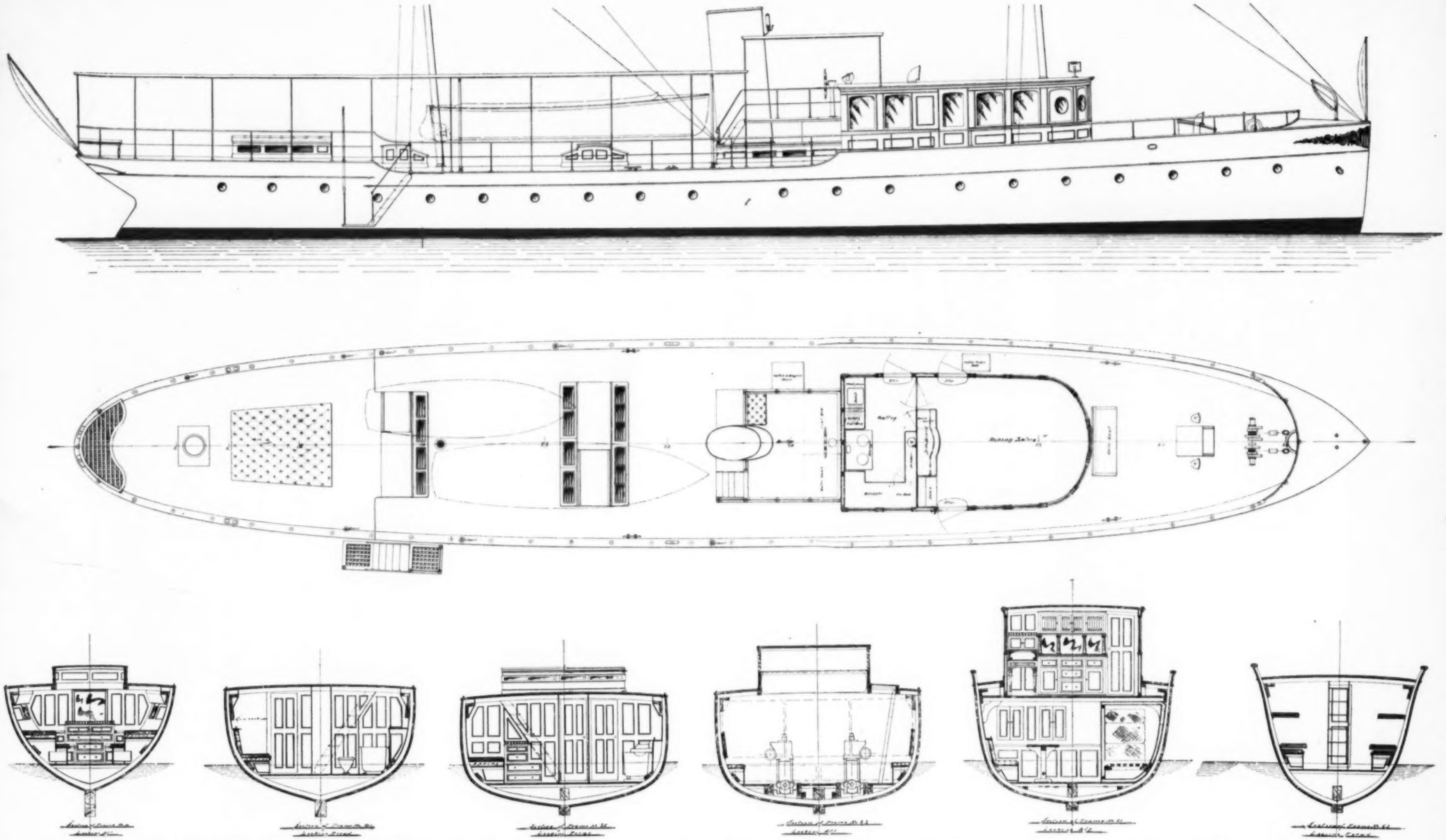
An unusual amount of light is admitted to the main cabin and engine room as well as to the forward cabin by means of the pullman windows in the sides. Sufficient space is left, allowing the sides of the cabin to permit a passageway from bow to stern upon both sides of the craft.

Additional ventilation is secured to the forward cabin and storeroom aft by means of port holes.





A 50-foot cruiser by the Atkin-Wheeler Company, equipped with a 20-h.p. motor and designed to cruise at a 10-mile speed.



Profile, deck plan and sections of Nemaha, described upon the following page. She is built of the maximum size for navigating the Erie Canal and will cruise this winter in Florida.

Nemaha, a 98-Foot Flush Deck Motor Cruiser.

UPON page 34 and below are shown the designs of a new 98-foot craft designed by Cox & Stevens, of New York City, for Mr. Huston Wyeth, a Western yachtsman, who is a member of the New York Yacht Club. The vessel was built by the Nilson Shipbuilding Company, of Baltimore, who are also constructing two other yachts of the same size by the same designers.

Nemaha is an interesting type of motor boat and has every requirement to make her suitable for Southern work as well as for general cruising. The construction throughout is of the best, and the interior arrangement is such that a maximum accommodation is afforded. The craft also will be exceedingly economical to operate.

The beam is 16 feet and the draft is 4 feet, the intention being to have the extreme dimensions within the limit for allowing the craft to pass through the locks of the Erie Canal, and the deck house is sufficiently low to enable the vessel to pass under the bridges without difficulty.

In type the vessel is a small steamer, being flush deck throughout with a raised freeboard forward and aft as in the case of Viator and other similar vessels. With the plumb stern and a full deck line forward, together with flaring sections and an elliptical stern, working down into the steamship type of underbody, the greatest possible waterline for over-all length is obtained. The motive power consists of two 6-cylinder 100-horsepower Standard motors of the air-starting type, all being contained in a central compartment separated from the rest of the vessel by watertight bulkheads. This compartment also contains the gasoline tanks, three in number, which are of copper, with a total capacity of 1,500 gallons, and a large electric generating set driven by a gasoline motor. The engine room is large and contains the bunks and lockers of the engineer and his assistants, in addition to a complete electric light plant.

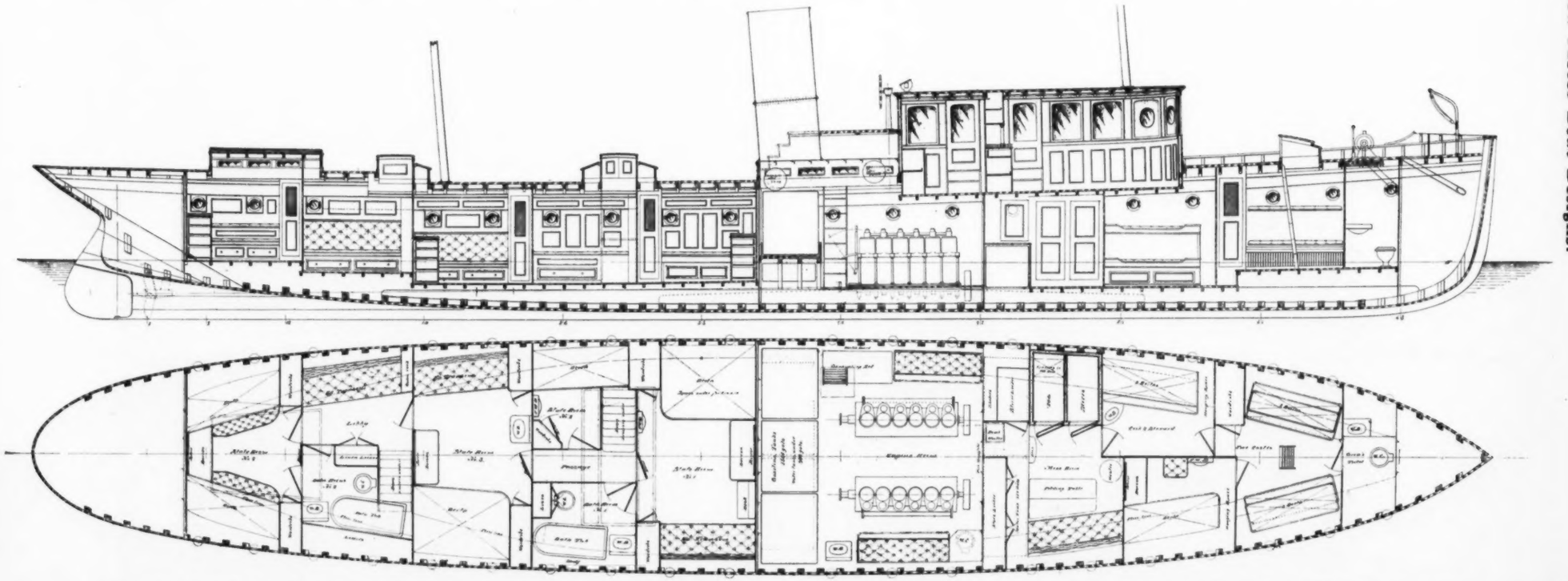
The hull of the vessel is built of wood, which is more suitable than steel for Southern cruising. The keel is unusually heavy and the timbers are placed very closely together and provided with five watertight bulkheads, giving a very rigid transverse construction.

The accommodations for the owner and guests have been arranged so to be aft of the engine space and two companionways are provided from the deck to these quarters. Opposite the lobby on the starboard side of the vessel, into which one of the companionways leads, is a large bathroom in which both fresh and salt water are supplied. A door opens from this room into the aft stateroom, which has been arranged to accommodate two guests.

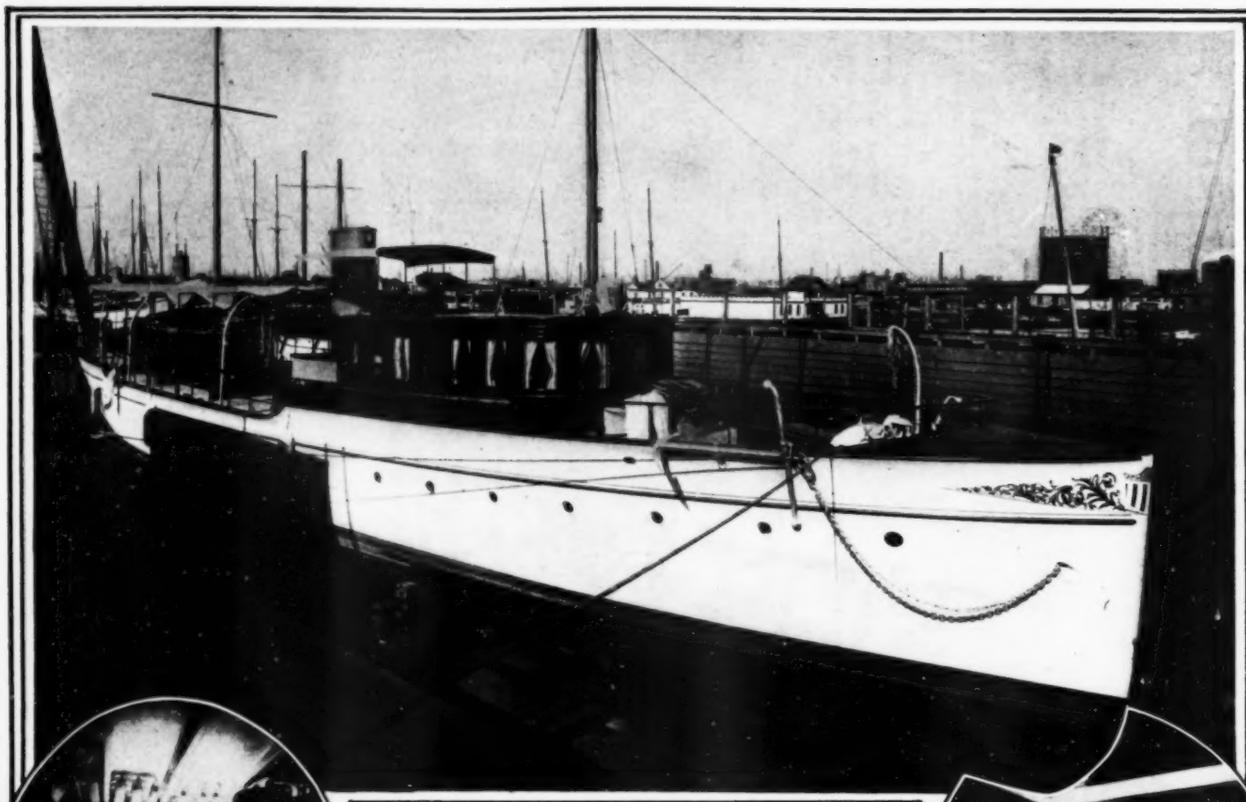
From the lobby another door communicates at the forward end with a stateroom extending the full width of the vessel. This room has, in addition to the door opening into the lobby, a door opening into a passage which communicates with another 9-foot stateroom, and has on its starboard side a large bathroom. Opposite this room on the port side is a single stateroom, and between this room and the double stateroom just mentioned is arranged the second companionway referred to.

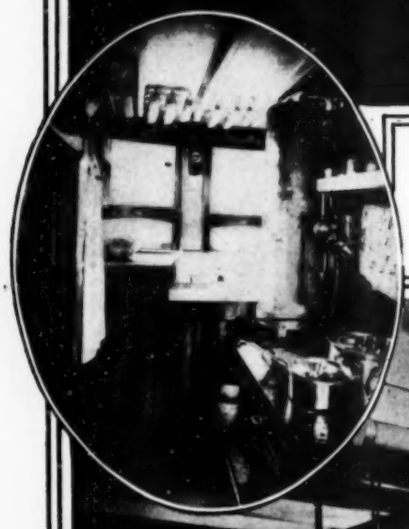
It will be seen that in this vessel the designers have secured three staterooms, each with a nine-foot fore and aft length; a lobby and two large bathrooms so placed that they are readily accessible to all of the staterooms.

The dining-room is in the deck-house and communicates with the galley by a dumbwaiter. Crew's quarters are provided below deck forward of the engine-room, and the captain is furnished with a separate stateroom. A number of interesting photographs showing views of this vessel will be found upon the following page.

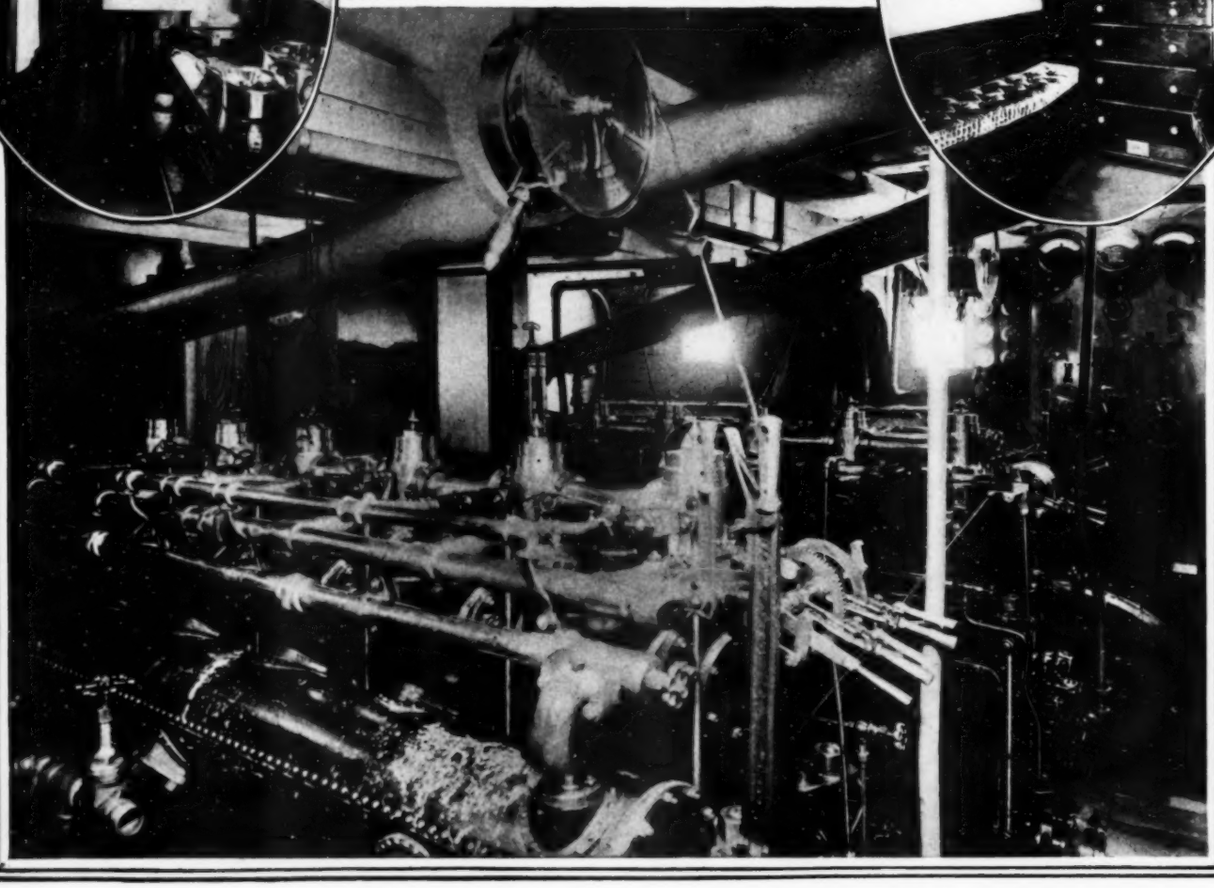


Nemaha has an underbody of the steamship type, thus obtaining the greatest possible waterline for over-all length and allowing more space for accommodations than with the ordinary type.





The **98-FOOTER NEMAHA**
and her
Brace of 100-H.P. Standard Motors.
(See design and description on two preceding pages.)



The Lungs of the Motor.

A Discussion of Carbureters for Marine Engines, Their Development and Construction. The Present Trend in Design for the Accommodation of Heavier Fuels.

By Edw. B. Church, M. E.

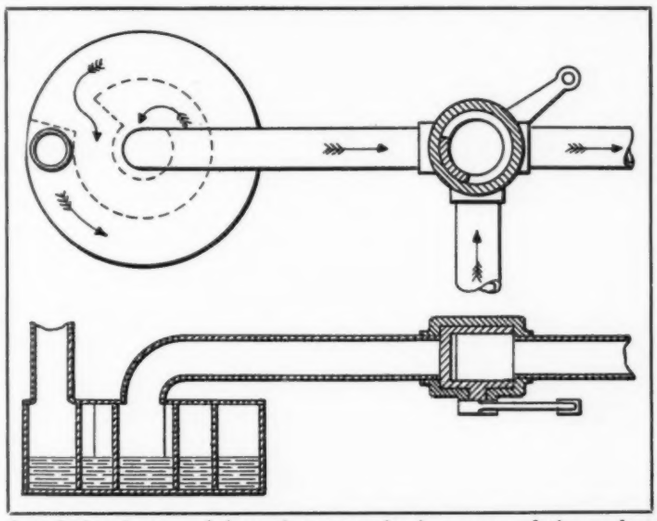
PROBABLY no part of the internal combustion engine has been the subject of as much thought and experiment as the mechanism furnishing the proper proportions of air and fuel, and commonly referred to as the "carbureter."

Though this name is correctly applied to only one particular type, it is in general use for all, and is probably as serviceable as any would be.

It is the purpose of this article to trace briefly the development of such devices; to discuss the difficulties of the problem as it presents itself to-day; to make a suggestion or two in all humility, and to give a necessarily short and crude outline of what may be expected in the near future.

Any carbureter, to be successful, must satisfy the following conditions to a considerable degree: It must furnish the proportion of air and fuel giving the most rapid combusion and the highest temperature; it must supply the fuel in a finely divided state, gaseous if possible, and thoroughly mixed with the air; it must be simple, economical and durable in construction and operation; and it must cause as little difference as possible between the pressure in the cylinder at the end of the suction stroke and that of the atmosphere.

When using producer, natural or illuminating gas as fuel, both ingredients of the mixture are gaseous, and are similar in their action under varying pressures and velocities, correct proportions being easily maintained. The fuel is naturally in a finely divided state, and the eddies caused by the passage to the motor, through the valves, and by the compression of the charge, mix it thoroughly with the air, without the need of any special provision. In stationary practice, where gas fuels predominate, an air valve of the mushroom type with constant lift, and a similar valve for fuel with variable lift to proportion the mixture, are generally used, and give excellent satisfaction.



A typical carbureter of the surface type, the forerunner of the modern devices. Note how the air was drawn over the surface of the gasoline and the method of controlling the auxiliary air supply.

Volatile liquid hydrocarbons present greater difficulties, and the early attempts to use them as fuel followed general gas practice as closely as possible. The fuel was vaporized by passing a current of air over or through it, the process being aided in some cases by the application of heat, or mechanical agitation of the liquid, and the vapor resulting used as was customary with gas fuels.

In the evaporation of any composite liquid, however, the more volatile constituents vaporize first, and a heavy residue remains which must be rejected. This caused considerable waste, and as the liquid became less and less volatile during the process, such devices required constant adjustment to preserve proper mixture proportions. These objections resulted in the abandonment of this method, in favor of the jet type of carbureter, though a similar process is now coming into use with the heavier hydrocarbons.

Essentially, the jet type of carbureter is a reservoir containing gasoline or similar fuel, which is kept at a constant level by a valve with a float attached. The fuel is drawn through an orifice in a jet or standpipe, placed in the air passage to the motor, by the air current induced during the suction stroke, the opening in the jet being slightly above the fuel level to prevent flow during the remainder of the cycle.

This idea, in its simplest form, worked well in practice, as long as the motor ran at full speed with free air and fuel supply. Any attempt to check the speed to any extent by throttling varied the mixture proportions so greatly that missed explosions and often entire failure of operation resulted. The same difficulty was encountered when an overload caused the motor to slow down appreciably, the poor proportioning of the charge causing a deficiency of power when the maximum was required.

These troubles led to the temporary adoption of other methods of governing; by ignition timing, which was wasteful of fuel; by cutting out some of the charges, which caused irregular running and considerable vibration; and by cutting out the ignition intermittently, which combined the evils of the others. In stationary engine construction, the practice of governing by omission of an occasional charge has survived, and if the load does not vary much, and large, heavy flywheels can be used to offset the sudden variations in speed, answers very well.

The use of internal combustion engines in automobile practice demanded light weight, absence of vibration, and greater range of speed and load than had been required before, and forced careful consideration of the problem.

Let the reader consider it a moment in a common-sense manner, as free from technicality as possible. Liquids and gases differ most widely in the physical properties of specific gravity and elasticity; the lightest liquid being many times as heavy as the heaviest gas under equal conditions; and liquids being practically incompressible, while gas volumes vary inversely in proportion to the pressure. The suction stroke of the piston induces an air current through the carbureter, which ceases almost immediately upon the termination of the stroke, the inertia of the air being slight. The fuel, of much higher specific gravity, continues to flow for an appreciable period, causing an excess of fuel which must be taken into the motor on the next suction stroke. This effect is not so apparent with high speed multi-cylinder motors, the successive aspirations tending to merge into a steady stream, except at low speed under heavy load, and can be provided for, under conditions of constant load and speed, by the original adjustment of air and fuel.

Attempts have been made to overcome this after flow by introducing resistance to the passage of the fuel through the jet, either by a number of small openings in place of one comparatively large, or by causing the column of fuel to take a tortuous course. Neither is very effective, for it is apparent that such resistance would produce the same result during the stroke as thereafter. The simple mixing valve used on a number of two-port, two-cycle motors is very efficient in this respect, as the fuel opening is closed by the air valve very quickly at the end of the piston stroke and there can be no afterflow. Another device that might be mentioned here makes use of two similar jets, placed horizontally and facing each other, the distance between being slightly greater than that required to prevent reduction of the area of the fuel openings. As the two streams are equal in diameter and velocity, they neutralize each other's inertia completely. This idea is not new, but for some reason has never found favor with engine constructors.

Returning to our motor, it will be evident that the velocity of the air current will not be constant throughout the aspiration period, but will increase and decrease in proportion to the speed of the piston at different points, and if the rotative speed of the motor varies, the velocity of the air current will be still more affected. The air velocity will be proportional to the preponderance of the atmospheric pressure over that in the cylinder, but gases lessen in density with a decrease of pressure, while liquids do not. Therefore, in a carbureter with openings of fixed area for air and fuel, as the speed of the motor increases, the air supply will become insufficient, owing to the decrease in density; or, conversely, if the proportion of areas is correct for high speed and air of low density, as the speed decreases the air supply will be too great. To properly appreciate the difficulty of approaching this question scientifically, it must be borne in mind that there are two distinct causes for variation in the air velocity; that due to change in rotative speed of the motor, and the other from the variation in the speed of the piston due to the action of the crank. While the former is always important, the latter may be practically disregarded except at very low speeds.

So far as the writer knows, no carbureter has been devised which is theoretically able to compensate for these differences in the behavior of the mixture elements, though there are several methods in use, that give excellent practical results, showing approximately accurate regulation.

In such apparatus, either the air or fuel supply, or both, are regulated automatically, either by mechanical means or by the lower air pressure within the carbureter. Generally speaking, it is difficult and more or less unsatisfactory to attempt fuel regulation for this purpose. The fuel orifice is very small in any case, very accurate and delicate mechanism is necessary, and these qualities are easily lost

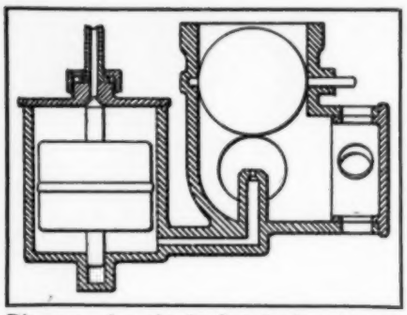


Diagram of a simple float-feed carbureter with manual auxiliary air control.

through slight wear of the parts. Fuel regulation has its place, however, and will be mentioned more fully later.

There are two systems of mechanical air control, an auxiliary air port being operated by a hydraulic or centrifugal device, or by direct connection to the throttle. The former regulates according to the motor speed, and the latter to the throttle opening, the latter method being that generally in use. Under varying loads, neither the motor speed nor the throttle opening is always proportional to the velocity of the mixture, and while these carbureters give a full charge, they do not afford the flexibility of those operated by air pressure. In such devices, the air valve is held closed by a spring or gravity, being lifted by the excess of the atmospheric pressure over that within the carbureter. This method gives great speed range, its disadvantages being liability to derangement through loss of spring tension or friction in the mechanism, which must work very freely. It does not give as full a charge, as it depends upon the partial vacuum in the carbureter for a means of operation.

The opening of any compensating air valve has two distinct effects. It supplies more air to the mixture, and by lessening the vacuum, the air entering through the fixed opening decreases in velocity and increases in density. This is more a matter of interest to the designer than to the layman, but serves to show the complexity of the problem.

In comparing the two types of air valve it should be remembered that engine power is based on a series of closely related pressures. The pressure attained by combustion of the charge depends upon that of the compression. The compression pressure in turn is proportional to that in the cylinder at the end of the suction stroke. In four-cycle motors the latter is almost always less than that of the atmosphere, the amount depending upon the resistance to the passage of the gases into the motor. In two-cycle construction the same rule holds good, the fulness of the charge depending upon the compression in the base, which takes the mixture in the same manner as the cylinder in the four-cycle type, there being two compressions instead of one. A comparatively slight increase in the carbureter resistance shows marked results in the power developed, as shown by the effect of throttling, which simply increases this resistance. This is only of importance when maximum power is required, as under throttled conditions it makes no difference whether the resistance is caused by the throttle position or is inherent in the construction of the carbureter.

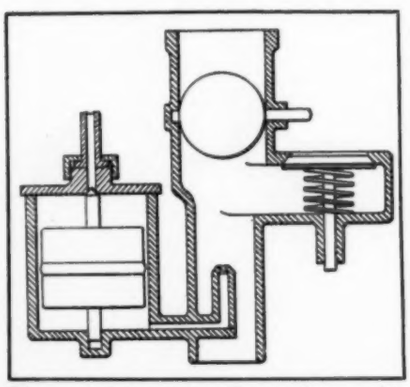


Diagram of the modern float-feed type with spring controlled air valve.

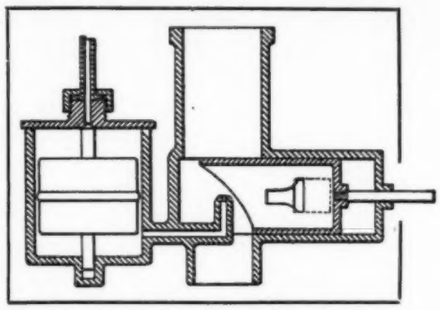
Another point in the use of liquid fuel that must not be lost sight of is that the fuel should be as finely divided and should form as homogeneous a mixture with the air as possible. At low speeds this is often important, there being in some cases a tendency to condensation and precipitation in the inlet passage, causing missed explosions, formation of soot, etc. Many suggestions toward a solution have been offered; division of the fuel stream into several small ones; placing a baffle immediately in front of the opening in the jet on which the column of fuel is broken up; a cone or similar surface swept by the air current, on which the fuel is sprayed and taken up by the air; and the application of heat, which is most effectual of all.

The expansion of any substance causes it to absorb heat from its surroundings, and in the case of gases or the rapid evaporation of liquids this effect is very marked. Unheated carbureters often become cold enough to condense and freeze the moisture of the atmosphere. Heat is usually applied by warming the air supply, or by jacketing the carbureter and passing the water of the circulating system or the exhaust gases through it. The exhaust method of heating has been generally discarded, as soot forms quickly in the jacket and eventually chokes it. The layer of soot also interferes with the transference of heat to the metal of the carbureter. It has been found that a fairly high velocity of the air passing the jet breaks up the fuel as effectually as anything, especially if the carbureter is kept at a fair temperature or the air is warmed slightly. Too large a carbureter for the motor will often cause stalling at low speeds, the velocity of the air by the jet being insufficient to induce the flow of fuel and to divide the particles. Too small a carbureter, on the other hand, will cause a loss of power at high speed, owing to the high vacuum maintained in it, and the consequent reduction of the charge. A warning must be uttered against maintaining too high a temperature. The higher the temperature, the lower the density of the charge, and any degree of heat beyond that necessary to vaporize the charge and to keep it in that condition will result in a distinct loss of power.

The form of a double truncated cone is often given to the fixed air passage, the fuel supply being taken at the smallest part, this form of passage being generally known as a Venturi tube. It is desirable that the form of the passages should be such that as little resistance as possible is offered to the flow of the mixture, and this device produces a stream practically free from eddies, and secures high velocity without great loss of pressure. While some authorities claim that an included angle of thirty degrees for the inlet and seven for the discharge produces the best results, there seems to be no agreement among carbureter manufacturers as to the correct proportions. The writer is inclined to think that the advantages of this idea have been overestimated, as shown from practically as good results being obtained from carbureters without this feature.

Carbureters have been constructed in series, only one being used for low speed and the others coming into operation as the throttle is opened. This principle has been carried to the extent of four or five air passages and jets. There does not seem to be any real justification for the complexity of such devices, though a great degree of flexibility is often secured by their use, and the openings in the jets, which must be very small, are a prolific source of trouble, as they become obstructed very easily.

In some motors the air alone has been drawn in on the suction stroke and compressed, the fuel being injected into the combustion chamber just before the time of ignition by a pump or high air pressure. This system is used principally with the heavier hydrocarbons, the well-



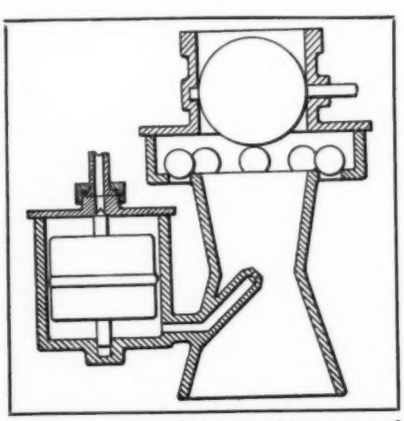
Another simple float-feed carbureter showing a method of controlling the throttle and auxiliary air supply with one valve.

known Diesel type of motor being the most conspicuous example. Here the compression is very high, about five hundred pounds for the average, and the compression of the air raises its temperature to such a point that combustion ensues when the fuel is injected, and no other ignition is necessary. The quantity of air admitted is constant, regulation being obtained by varying the amount of fuel. Enormous temperatures and pressures are reached during combustion, and careful construction is essential. The working parts of such motors are very large in proportion to the cylinder diameter, and very heavy flywheels are used. The writer does not know of any attempts to use this system in small units, except for stationary practice.

In Europe some very large engines have been constructed on this principle, the power being as high as fifteen hundred horse power per cylinder.

As a guide to those wishing to select a carbureter for a specific purpose, it might be said that under conditions of practically constant load and speed, a carbureter, with hot water jacket and hand-controlled adjustments of air and fuel, will probably give greater power with less fuel than any with automatic control, and especially those relying on difference of pressure for regulation. Such a carbureter should be as large in area as can be used without decreasing the velocity of the mixture too much, with due regard to the difficulty of starting with large areas.

In marine installations, where full power is required most of the time, under generally constant load, and where throttling is only used when the load is removed by throwing out the clutch, the mechanically operated air valve, working in conjunction with the throttle, would seem to be the one best adapted. Accurate compensation is necessary only at the extreme positions of the throttle, and as the air admission does not depend upon a difference in pressures, a denser and more powerful charge can be supplied to the motor. It is also true that in such work the throttle position is proportional to the motor speed and the air velocity, and if the ports are once properly adjusted they will remain so.

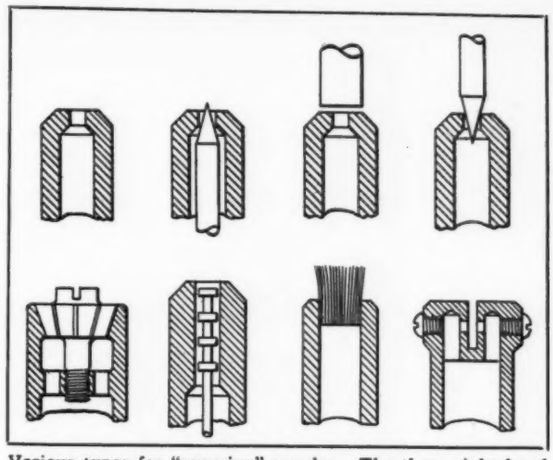


A gravity system of air control by means of steel balls seating in circular openings.

In automobile practice, the severest conditions are encountered. Climbing hills, with wide open throttle, the motor speed and the air velocity remain low. Again, down hill, the motor may be running fast with the throttle almost closed. It will be seen that the device recommended for marine practice falls far short of the requirements here, on account of the extreme variations of load. The spring or gravity controlled air valve, being directly operated by the air velocity, is much more satisfactory under such conditions. Its only failings are a tendency to lose its adjustment through change of spring tension or wear, liability to stick through excessive friction as the movement is not positive, and a somewhat reduced charge. Careful design and construction will do much toward removing the first two objections.

For large stationary or marine work, the Diesel system has probably higher efficiency and greater economy of fuel than any other, but it requires special design throughout the motor, and fuel injection in general has only been applied to any extent to motors used in aviation, where the load is constant.

It would seem as if a combination of the two types in general use would prove advantageous in a great many cases. A carbureter with a spring-controlled air valve compensating for throttle positions up to three-quarter open, and a mechanically controlled air valve, taking up the function at that point, does not seem to require too much complication, in view of some of the fearful and wonderful mechanisms that have been proposed. The spring valve would give excellent compensation under reduced power, its strongest point; and the positive valve would prevent reduction of the charge at high speed. The transition would be gradual, from one system to the other, and the advantages of both types secured to a great extent. If the principle of impinging jets was used to prevent derangement of the mixture proportions from the pulsation of the current, the device would appear to be as free from criticism as any, from either a theoretical or a practical standpoint.



Various types for "spraying" nozzles. The three right hand ones in the lower row, while interesting, are now seldom used.

When considering the future of internal combustion engine practice from the carbureter standpoint, it must be remembered that the supply of gasoline, the almost universal fuel at present, is limited, and that other fuels, most of which are much less volatile, must be dealt with before long. Looking back on the difficulties encountered with gasoline, if other fuels are to be used in a similar manner, there are apparently a good many years of experiment ahead. As an indication of what can be done, however, and to offer a little encouragement, the writer would mention a car entered some years ago in one of the automobile contests in Europe, where a prize was offered for the most novel fuel. This car ran on gasoline the first day, on alcohol the second, with a different carbureter, and on the third day, with a third mechanism, naphthaline moth balls were successfully vaporized and good combustion secured.

Alcohol does not seem to make much headway as a fuel, though it can be produced in unlimited quantities, and is more similar in its action to gasoline than any other commercial product that appears available. The prohibitive tax placed on ethyl or grain alcohol unless denatured, and the uncertainty of the nature of the adulterant to be used for this purpose, seem to be the principal reasons. Some of the denaturing elements have a bad effect on the motor, and imperfect combustion of alcohol itself, which produces acetic acid, is a serious complication.

Kerosene has been in use to some extent for a considerable period, but has never received popular favor, though the results obtained have been very good in many cases. The limitation of the available supply is true in regard to kerosene as well as gasoline, but to a lesser extent.

Many experiments are being made with apparatus similar in principle to the original method for using gasoline; that is, vaporizing the fuel before proportioning it to the air supply. Gas producers for liquid hydrocarbons are already in use, being similar to those used for coal or coke and almost as satisfactory. These would seem to offer better prospects of success than attempts to vaporize heavy fuels after proportioning, either in some form of carbureter or in the motor itself, as in the Diesel type. The writer expects to see producers in use shortly for liquid hydrocarbons, which will produce a satisfactory gas from crude oil without much residue, and the consequent simplification of the motor and its mixing and proportioning attachments will do much toward offsetting the complication and cost of the producer.

The pioneers of science will solve the problem as they have others, and are pursuing their investigations of natural phenomena, though in the face of criticism and ridicule, and with a realization of the fact that the discoverer of nature's truths is rarely or adequately rewarded.

A Ranchman's Seven-Year Cruise.

SEYMOUR DANE, the ranchman from Malta, Mont., has started on one of the most interesting trips ever taken in a cruising motor boat. Mr. Dane spent 20 years raising cattle out in the waterless wastes of Montana with all the time a well developed hankering for a sailor's life. He believes now that he has earned his passage, and has started out to enjoy himself.

He left Chicago a few weeks ago for a seven-year voyage. His 60 ft. cabin cruiser, Montana, was designed by himself and built by the Racine Boat Company. The motive power is a pair of 40 h.p. heavy duty Sterling engines. The craft was launched at Racine, Wis., and brought to Chicago through a 55 mile gale. "She bucked the waves like an iron nerved little broncho," declared Dane after the trip. Being an exceptionally large cruiser, the Montana had some difficulty in getting through the bridges along the Drainage Canal on its way south. For this reason she was held up several days until the Drainage Board made special preparations to lock her through and get her started on her voyage.

Dane made stops enroute at St. Louis, Memphis and New Orleans. From the latter city he will cruise directly across the Gulf to Havana, Cuba. He has not decided what ports he will visit, but will probably touch all of the Central American States, as he expects to be in the Caribbean Sea for the next year or two, until the opening of the Panama Canal. It is his intention to be *one* of the first to pass through the Canal, and the *first* to go through in a motor boat. Cruising west through the canal to the Pacific, he will run north to Seattle and then probably continue to Alaska, following the various streams inland with a view to laying out mining claims in that section. He is well equipped for his trip and carries everything that tends toward comfort.

THE SHOW NUMBERS.

The February issue of MoToR BoatinG will be the Boston Show Number, and considerable space will be given to descriptions of the various boats, engines and accessories to be exhibited at the Mechanics' Buildings, from January 27th to February 3d.

In the March issue a corresponding space will be devoted to a description of the exhibits to be seen at the New York Show, to be held in the 69th Regiment Armory, from February 17th to 24th.

Exhibitors at either show are requested to send in descriptions of the boats, engines or accessories, that they are to have on exhibition, together with photographs or drawings of the interesting features, so that we may prepare descriptions of them for publication.

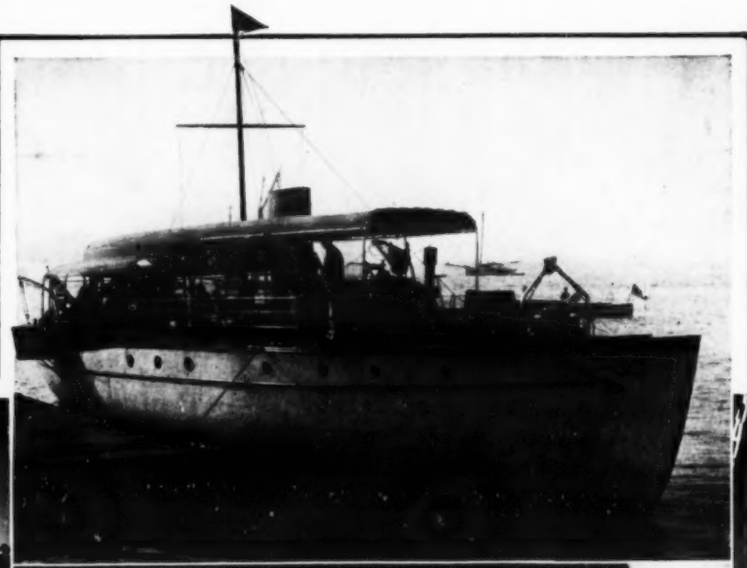
Flora Del Mar, a 65-Footer for General Cruising.

THE 65-foot cruiser Flora Del Mar was designed by Messrs. Whittelsey & Whittelsey, of New York City, for Commodore Blaisdall, of the Port Washington Yacht Club, who used her the greater part of the season for general cruising along the coast.

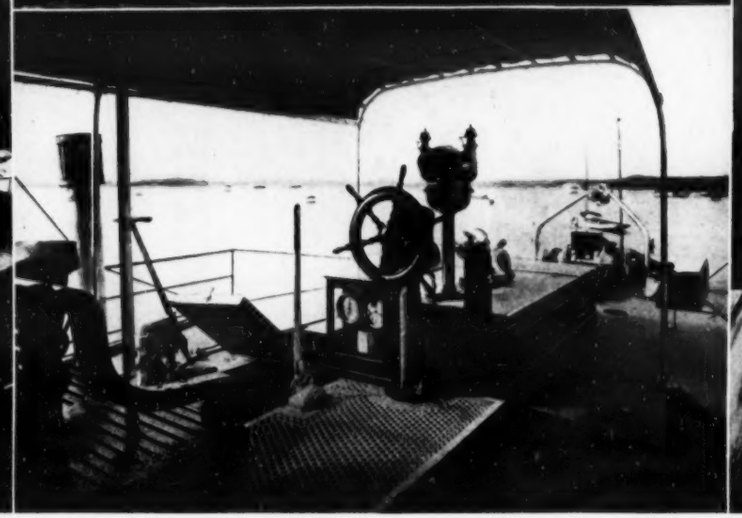
Because of her convenient arrangement both above and below decks she is quite an interesting craft, and a good idea of the interior layout may be had from the cabin plan on the following page. The two middle photographs on this page give an idea of her exceptionally large available deck space. It will be seen that the bridge deck is continuous with the raised deck forward, which is obstructed only by the usual fittings and a small trunk over the engine. The raised sides, as usual in the Whittelsey designs, extend to a point somewhat abaft amidships, the raised deck continuing still farther aft as the roof of a trunk cabin. The cabin roof and after deck are both railed and are available for wicker chairs. They are thoroughly protected by the interesting arrangement of awnings shown in the photograph.

Below decks the boat is divided into two sections by the saloon amidships, which is entered directly by a companionway on the starboard side. Just aft of this saloon is a full-width stateroom with a large double berth on one side and a wide divan on the other, besides bureau, lockers, etc. The lobby at the foot of the second companionway is just aft of this room on the starboard side, and occupying the corresponding space to port is a toilet room. There is another full-width stateroom occupying the remaining space beneath the cabin trunk, and a large gasoline tank is installed beneath the after deck.

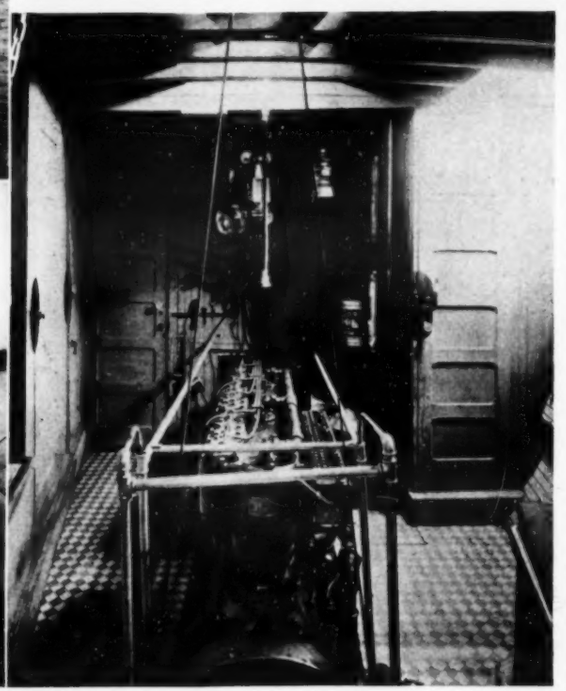
The unique feature of the owner's quarters is the additional companionway, making it possible to go from any room to



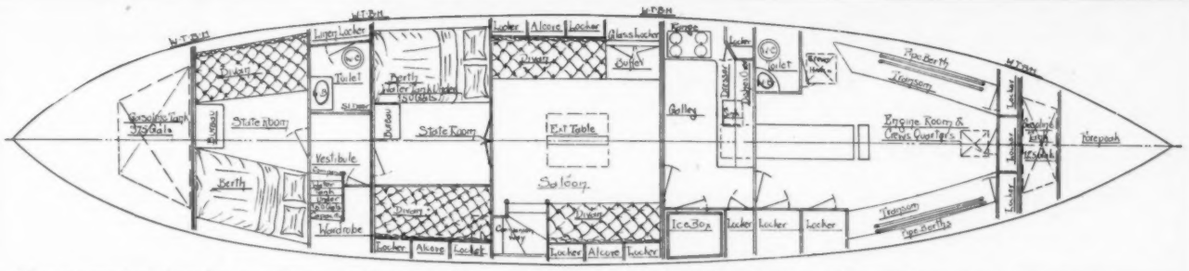
The galley extends the full width of the boat between the engine room and the main saloon.



The bridge deck is directly above the engine-room, and the hatch shown to port gives easy access to the latter.



The 60-75 h.p. Ideal motor is thoroughly accessible. Note belt which drives generator installed above.



The convenient interior arrangement of the 65-foot cruiser Flora Del Mar described on the preceding page. Note the two companionways to the living quarters.

the deck without passing through another room.

Going forward from the saloon the first compartment is a large galley extending the full width of the boat and separating the saloon from the engine room and crew's quarters forward. The motor is a 60-75 horsepower Ideal and is installed so as to be thoroughly accessible. It is controlled from the deck so that the steersman can operate it.

The boat, as a whole, is a good example of the all-round cruiser in which comfort and seaworthiness are the first considerations. The underbody is well balanced and the draft has not been stinted, so that the boat is a consistent performer in all kinds of weather. The principal dimensions are 65 ft. over all, 14 ft. beam and 4 ft. draft.

The Largest Diesel Driven Ship.

A 525-Footer of 15,000 Tons Carrying Capacity and Her Diesel Motors of 3,500 H. P.

By J. Rendall Wilson.

THE German-American Petroleum Company, whose cargo fleet actually comprises 23 vessels, totaling a Brutto tonnage of 84,000 tons, have, in order to increase and modernize it, recently contracted with several German shipbuilders for the construction of some additional craft for petroleum traffic between Europe and North America, or the Far East, respectively. Part of these ships, which all will be designed as tank ships, will be driven by oil motors of the Diesel type, thus showing a new departure in the construction of this kind of freighters which, chiefly with a view to increase the safety against fire, calls for general adoption.

Among these motor-ships the chief interest of builders, as well as of ship-owners, is engaged by the unusual dimensions of one of them, having a loading capacity of about 15,000 tons, thus claiming to be the largest of all tank-ships ever built. Besides, this transporter, the construction of which is being carried out at Fried Krupp's yards at Kiel, will be the largest motor-driven ship constructed up till now. *

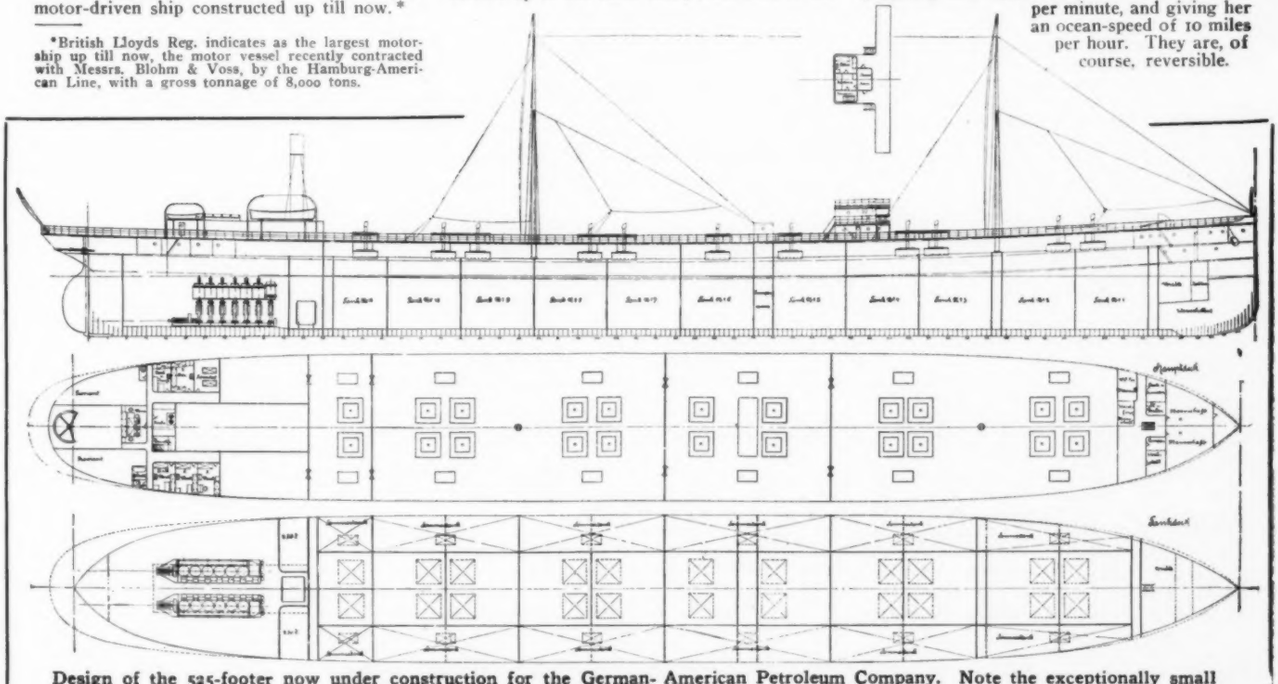
*British Lloyds Reg. indicates as the largest motor-ship up till now, the motor vessel recently contracted with Messrs. Blohm & Voss, by the Hamburg-American Line, with a gross tonnage of 8,000 tons.

The vessel is designed on the Isherwood longitudinal system, and her leading dimensions are as follows: Length between p.p. 160 m. (525 feet), breadth moulded 20.19 m. (66 feet 3 inches), and moulded depth 12.57 m. (33 feet 6 inches). She will be of the shelter-deck type, with three decks running from stem to stern. Special arrangements will afford determinate advantages with a view to tonnage measurement, the whole of the upper 'tween deck not being taken into account, thus entailing a small net tonnage compared with the displacement of the ship.

The tanks occupy two-thirds of her length. By transverse bulkheads they are divided up into eleven compartments, which in their turn are separated into twenty-two tanks, and are separated by a longitudinal bulkhead extending over the whole length. Their height is carried up to the third deck; from here to the second deck, and taking one-fourth of the whole beam, an expansion hold extends all over the length of the tanks, in order to reduce the moving surface of the cargo to one-fourth of the ship's beam. Alongside the expansion-hold, so-called summer-tanks are arranged for, partly to increase the loading capacity for the larger quantity of a bulk-cargo of lower specific weight as commonly carried, partly with a view to the rules of freeboard, the height of which is varying with the season.

In order to ensure the tightness of the bow and stern compartments against infiltration of oil due to some leakage of the tanks, cofferdams are installed fore and aft, consisting of a protecting room formed by two transverse bulkheads. An additional cofferdam between the tanks 2 and 3 allows of keeping perfectly separated different oil-parcels.

For propelling the ship, two single-acting, two-cycle Germania-Diesel engines of Krupp's own design and construction are provided, aggregating about 3,500 b.h.p. at 125 revolutions per minute, and giving her an ocean-speed of 10 miles per hour. They are, of course, reversible.



Design of the 525-footer now under construction for the German- American Petroleum Company. Note the exceptionally small space occupied by the power plant compared to that for cargo.

The Arrangement Below Decks.

The Fun to be Had in Laying out the Cruiser's Interior and Some Few Considerations to be Taken Into Account When Doing It.

By J. H. Wells.

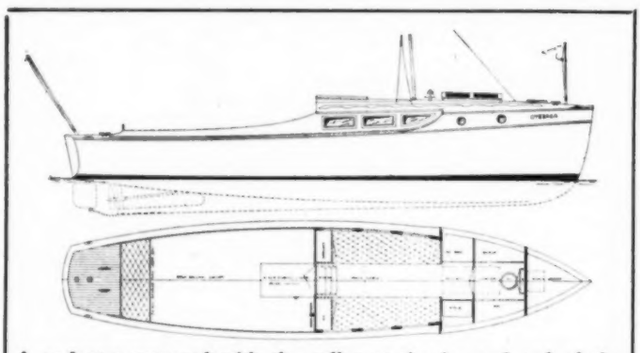
MANY cruising boat enthusiasts have told me that they derive almost as much pleasure from the planning of the new boat to suit their needs, as from its actual use. In no branch of construction are there the possibilities for variation and opportunities for personal ideas, as in the design of the motor cruiser. The final arrangement is bound to be a compromise, and is in no wise an exact science.

There are three different classes or sizes of the cruising boat, which are more or less distinct: First, the small cruiser, or boat, capable of one-man control. The limit in length of this class is, let us say, 50 feet. Second, the cruiser that requires a limited crew, of which the owner is usually an active part. This class finds its limit at about 80 feet. The third class includes the motor craft of greater length, which usually correspond, in appointments and luxuries, to the steam yacht, and require a larger and skilled crew.

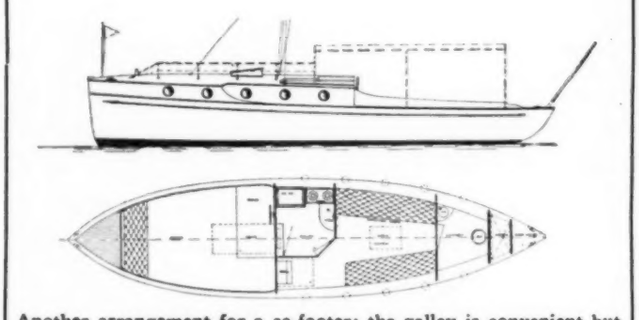
In this sketch we shall interest ourselves in the first two classes, as the purchaser of a yacht of the third class must leave the arrangement to the skill of the experienced designer, after outlining to him the service intended, and accommodations required. In the small cruisers, between 30 and 40 feet, the owner usually is willing to forego many of the comforts found in the larger boats, and with a party of congenial friends, "rough it" for the fun there is in the sport. Each buyer must first choose the type of boat suited to the conditions of the service, and find the practical limit of size in the accommodations for the friends he wishes with him.

The first thought should be given to the location of the power, and the distribution of the weight that will leave the ends of the boat light and buoyant. Then, how can the power be most easily handled at the steering wheel, as it is usually unnecessary to carry an engineer to answer signals from the helmsman on so small a boat. Unfortunately, the motor location is usually the last consideration of the novice. It is assumed that a certain type of house and hull is adopted to get the best combination of accommodations and outside deck room.

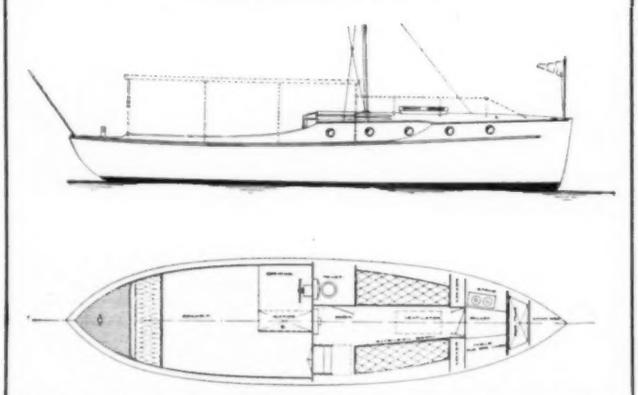
Having decided on the position for the motive power, an attempt should be made to arrange things so that it is get-at-able and can be removed from the boat if necessary. In a small cruiser of the raised deck type, the motor is usually aft of amidships, with the cylinders just inside the cabin, or under a portable hood or hatch in the cockpit. If the passageway from the cabin is alongside the motor, those passing may be easily protected by a bulkhead, or metal framework over which leather is stretched, but any covering that might be arranged should be easily portable. The engine smell in the cabin is apt to be annoying, especially when there is a stiff sea rolling, and there are ways of placing a motor so that it is effectually separated from the cabin.



A 32-footer arranged with the galley at the forward end of the main cabin.



Another arrangement for a 32-footer; the galley is convenient but in a separate compartment.



A third cabin interior. The galley is forward, as in the first, but is separate.

A decision must be made as to the space for sleeping accommodations, allowing a comfortable bunk for each person, with plenty of locker room and hanging space. The fewer the "make-up" variety of beds that can be used the better. Try to make the seat wide enough to sleep on without an extension or a patent hinging affair. When the berths are made up, is there a clear passage through the cabin, and an emergency exit forward?

The toilet room should be placed in the least valuable part of the floor space, and should be easily accessible.

The galley on a small cruiser is usually in the motor room, but this should be separated if possible, and good ventilation provided. Sometimes this is put in the main cabin where it can be placed in a concealed position. There is always the objection, however of lingering odors in the cabin from the cooking, and amateur cooks are usually very sucessful in making the lingering variety. The open flame oil stove is best away from the motor room, on account of its exposure to gasoline fumes from the carbureter. The above-can often be placed on the shelf over the icebox or refrigerator, and space under low headroom used for storage lockers, sink and work-table.

One fault of many layouts in small boats is the tendency to cut the boat into a number of small compartments or rooms, so that one feels boxed up just as soon as he gets below decks. A long roomy cabin, with berths on transoms, and hinging pipe berths for doubling up, is always to be preferred. Privacy can easily be obtained by means of dividing curtains, like those used on a Pullman car. Every cabin should have a little more locker space than is first considered necessary, and many little spaces under steps, back of seats, or sides of entrances, can be utilized to good advantage for this purpose. A hanging locker, not less than 10 inches in width, and extending as far as one can comfortably reach, can usually be arranged at the bulkhead dividing two compartments. A nest of drawers comes in very well for convenience and stowage of linen.

The double house type, which is most practical between the length of 40 and 50 feet, usually has the raised deck forward, with bridge deck separating this from the cabin house aft. Here a bulkhead under the bridge deck can usually be placed to separate the engine space from the owner's quarters in the after house. This bulkhead is an excellent feature for stiffening the hull, and can be made of either steel or wood, practically watertight. The motor would be installed just forward of amidships, with space in bow for seats, and a couple of pipe berths, if desired. Sometimes the galley is arranged well toward the bow, but passageway to the after cabin is usually a difficulty of this arrangement.

The fuel and water tanks can usually be located under the amidship deck and after deck. The controls and steering wheel are placed on the bridge or amidship deck, where the steersman will not be crowded. This bridge may be large enough for seating six to ten people on chairs with possibly a divan seat over the after house.

A feature that is often found nowadays, and which makes for safety and strength, is a watertight bulkhead located at either the bow or stern and which, in connection with the bulkhead under the bridge deck, divides the boat into three or four compartments. The compartment that should be the best protected is the motor room, as with this free from water headway can easily be made to shore in case of an accident.

The after house may incorporate galley, main cabin, toilet, and possibly a stateroom, but the stateroom feature is hardly practical

on a boat under 50 feet in length. It would be much better to arrange the main cabin in as large a room as possible, as this is the only inside lounging space on the craft.

Having disposed of the general layout for sleeping room, motor space, and living quarters, we shall next consider one of the most important features on the whole boat— the deck room. Possibly this does not come under "laying out a cabin interior," but is so closely co-related that it should get its share of consideration. The deck is the real living room of the boat. Watch the crowd when the cruiser gets under way —they don't go inside. Everyone wants to find a comfortable spot to lounge on deck, either in a chair or stretched out on the cabin top. Now, there is endless discussion as to the merits and demerits of cockpits, flush decks and raised decks, but the small cruiser seems best adapted to the cockpit idea, with seating room in permanent seats or chairs. This brings the weight of the passengers low in the boat, and lessens the apparent motion. The cockpit can easily be made self-bailing, and will take care of practically all the water that such a boat usually takes on board. Covering this with a canopy and side curtains makes it relatively tight, and really forms the best sleeping room on the whole boat. Cots folding into a very small roll can often be utilized for extra passengers.

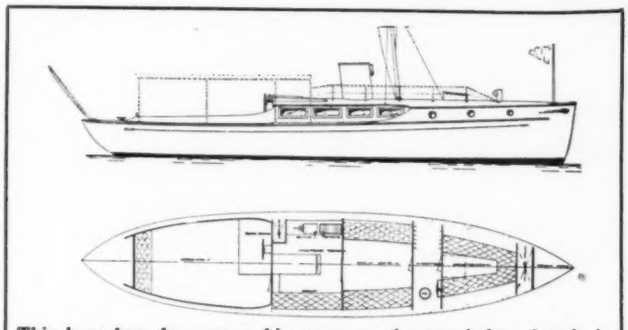
As we go up in size the flush deck has the best talking points, but whichever is chosen, get plenty of it. After you have added up all your cabin and deck lengths, add four or five feet more for luck. A secret not usually understood, is that it does not cost the builder a great deal to add overhangs without joinerwork. At a small additional cost a great deal of real comfort can be obtained on deck, with an opportunity for better distribution of weights.

In the Western types, especially those of the Pacific Coast, deckroom, apparently, is not sought for, and the effort to "dovetail" living accommodations is quite apparent. There are good reasons why the Pacific builders nearly always provide a house for the helmsman, and there are equally good reasons for different features for the Florida boat, the lake boat, and the off-shore cruiser.

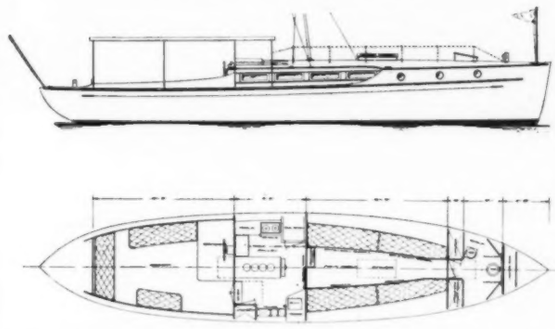
Another consideration is the safety and protection of passengers and crew. Have good high coamings or rails, and something to hold on to, that is bolted to the house beams, to get forward to handle lines and anchors. Things get pretty lively at times, and a safe hand and foothold for the entire length of the boat is essential. Weather cloths can easily be arranged to protect the man at the wheel.

In the larger cruiser, the general method of procedure is very nearly the same, only that one has more latitude in making the quarters comfortable and homelike. The owner usually has had experience in "roughing it" in his smaller boat, and now seeks those conveniences that were not possible before. He will have one or two paid hands on board, who are usually housed forward, where the floor space is the least valuable.

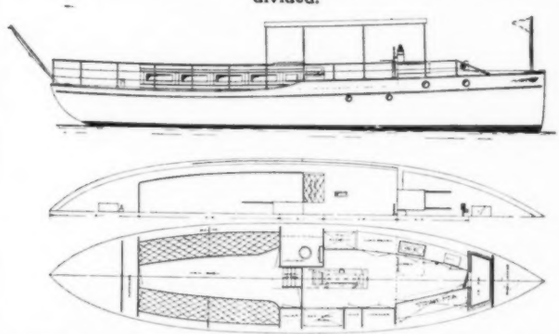
The crew's quarters should be entirely separated from those of the owner, and the present tendency seems to be to improve their conditions over what was considered "good enough" a few years ago. Their lavatory conveniences usually can be arranged either in the extreme bow aft of the chain well, or in the motor room. The ventilation and working room in the motor compartment should be as liberal as possible. The gasoline tanks should be located where the elements of danger are reduced to a minimum. On craft constructed by the recognized builders, the element of danger from explosion is almost negligible. Various opinions are held as to the proper installation for gasoline, which in itself is a subject worthy of a great deal of discussion. Suffice it to say that the tanks should be arranged so that they can be inspected from time to time, and firmly cradled and protected against any injury.



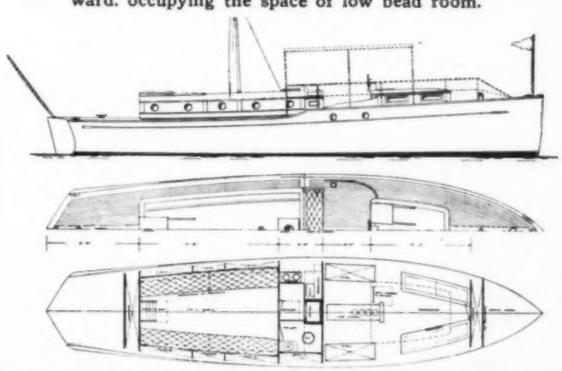
This boat has the same cabin space as the one below, but it is divided into small compartments.



More room, with less privacy, is secured when the cabin is not divided.



A bridge-deck cruiser 45 feet in length. The motor is farther forward, occupying the space of low bead room.



Another 45-footer with two deck houses, one of the most convenient arrangements shown.

The living-room and dining-room are usually identical, and here the dimensions should be liberal in order that homelike features may be worked out. The seats should be deep and low, with plenty of alcove and locker room above. A great deal of expense may be gone to in the selection of buffets, glass lockers, tables and fine finish, but the simpler these features are kept the richer the effect. On a boat running from 70 to 75 feet the dining-room should not be less than 10 to 12 feet, with the galley immediately adjoining.

If the dining-room is forward of amidship, the galley is often worked in between this and the motor room, so that in a length of 5 to 6 feet good room is obtained for all galley conveniences. If a coal stove be used the draft can be carried through the stack over the motor room.

The galley placed under the low deck, either forward or amidship, is usually unsatisfactory, on account of lack of good ventilation, light and headroom. The icebox can usually be arranged to fill from deck, with drains outboard from the ice-pans and provision compartment. The space under the dining-room may often be utilized for storage room and supply lockers, and often for captain's and engineer's staterooms.

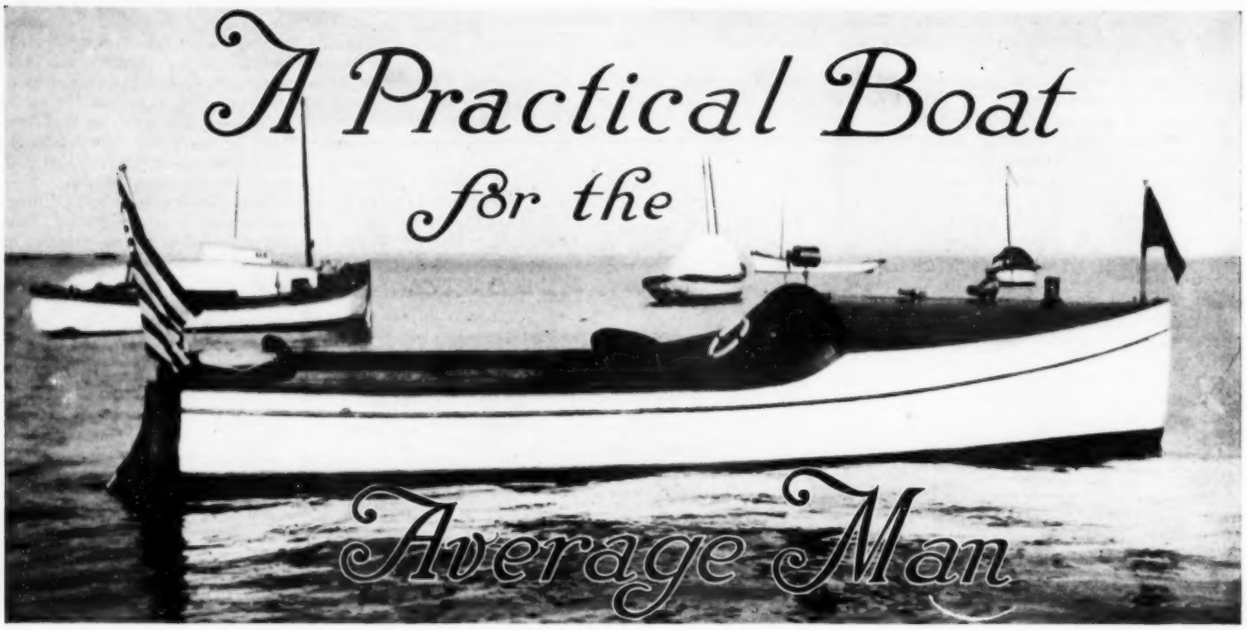
The after quarters are usually given over to sleeping rooms, which can readily be arranged so that there is a good-sized lobby from which any room may be reached without any disturbance. The bathroom is usually placed at the foot of the stairs, and in larger boats the owner often has his private bath, with a separate room for his guests. If the tub can be placed above the waterline a great deal of inconvenience and trouble will be avoided by draining outboard. Otherwise, it will be necessary to install slop-tanks drained by pumps, or pumped out by hand. As most of the boats are fitted with electric plants, appliances can be secured that work these features mechanically.

Another thing that should be taken into consideration, is the storage of suit-cases and small trunks. Too often boats are built without any provision whatever for caring for these features.

The stateroom that works out the most successfully is the one that extends the full width of the boat, with a 4 ft. 3 in. double berth on one side, and a sofa berth opposite, low and deeply upholstered. The dresser is placed between with drawer and shelf room. Each stateroom should have at least one hanging locker not less than 15 inches wide, and as deep as practicable.

As the size of the boat increases many opportunities are possible for economy in room without discomfort, and each case presents an entirely different problem for solution.

A Practical Boat for the Average Man



Possibilities of the V-Bottom.

By Leo D. Baker.

NO matter how big our ideas may be, the most of us have to make our boat fit the pocket-book, and it is a mighty hard thing to decide upon a type of boat that will come nearest to filling our desires, and yet leave the price of a meal.

The author took over a year to decide upon the boat here described—his desk meanwhile looking like a near naval architect's, while the office as a whole was so piled with catalogs as to resemble a public library in distress.

What I wanted was this: A small boat, of small initiial cost and proportionately small upkeep, and running expenses. It must be capable of taking my family and friends comfortably, safe and dry, through any sea that a boat of its size should be in (my cruising ground is the open Pacific Ocean, with my home port at Avalon, Catalina Island, twenty-seven miles from the mainland). My requirements would sum up about as follows:

1. Low initial cost, and upkeep. 2. Seaworthiness. 3. Capacity for six or seven in comfortable seats. 4. Engine and equipment concealed in separate apartment, but instantly accessible. 5. Sleeping accommodations for two on a camping trip. 6. Speed. 7. Last, but not least, looks.

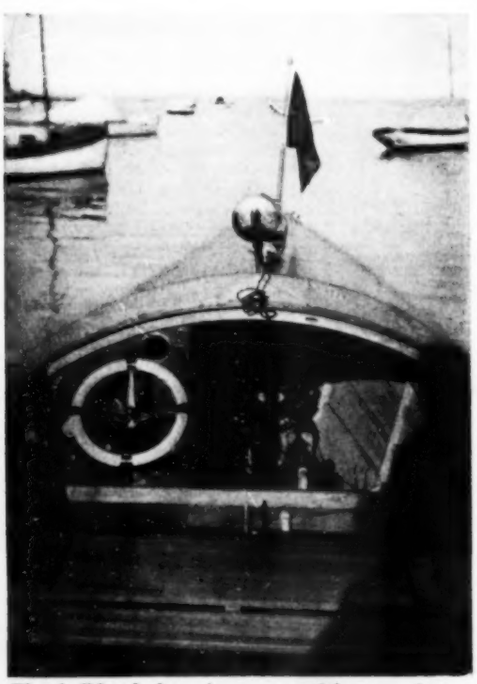
I finally decided, from my experience with V-bottom boats, that a properly designed hull of that type would fill my needs to a rather remarkable extent, giving maximum seaworthiness, room and speed for a minimum over all length, beam and power. My final decision was a 21 ft. 9 in. x 4 ft. 11 in. stock design by Mr. Wm. Hand, Jr., a man who has probably done more than any other to bring this type of boat to its present efficiency; following his design absolutely as to underbody, but changing the upper works to meet my demands for an all-around useful boat.

The underbody is V-shaped throughout, slightly flared forward to throw off the water in a rough seaway. The after sections are very flat, but enough V to prevent pounding at anchor or in a seaway. The square bilges make the boat unusually steady and stiff for so small a craft, and the same time allow of unusual width to the cockpit floor.

The upper works were changed by the addition of a "raised-deck" forward, giving about six inches more freeboard at this point, and with crowned deck shown in the illustrations, giving ample headroom to work around the engine without cutting hatches in the deck, a decided improvement, as I have yet to see watertight hatches that will stay watertight in a small boat of medium construction.

The hull is very substantially built, but at the same time is not heavy, the frame throughout is of oak, the planking finished ½ inch, with hard pine battons riveted under each seam, making a tight boat that has never leaked except through the stuffing-box. The decks are of ⅜" cedar, finished bright, while coaming, fenders, rudder, seats and lazybacks are of beautifully grained white ash, far superior in my mind to oak, as it will not turn black upon contact with salt water, a defect of oak that most boat owners know to their sorrow. The fastenings and fittings throughout are of copper, brass or bronze, in fact, every part of the boat and its equipment is the best to be had upon the market; my desires being for a small boat with the best of finish and equipment, rather than a larger boat with mediocre finish and equipment, which could be built for the same price.

The first nine feet from the stem is covered by the raised deck and contains the engine and its equipment. This is separated from the rest of the boat by the bulkhead shown in the illustration, on which are centralized all the controls for the boat, making it a true one-man boat, and one extremely easy to handle. On the port side is placed the auto steering wheel, with engine controls, around which are grouped electric binnacle, and gage lights, kick switches for lights, and ignition, air gauge, electric plugs, pulls for whistle, air and bilge pumps. The starboard side of bulkhead is removable, giving instant and easy access to motor compartment. The next two feet aft is



The bulkhead door is more satisfactory than a hatch, the raised deck gives plenty of head room.

One padlock secures the vitals of the boat against the inquisitive visitor.

the operator's cockpit, with reverse lever at operator's right hand, and an instantly removable hatch over reverse gear. Aft of this is the operator's seat, 16 in. wide, and extending the full width of the cockpit, this seat has a comfortable folding back, and under it is placed the main gasoline tank of thirty-gallon capacity, bulkheaded in to meet the insurance underwriter's requirements.

The next 5 ft. 7 in. is open cockpit with ample room for four good comfortable chairs, the floor is covered with corrugated rubber as is the operator's cockpit, and has removable hatch over shaft. The next 16 in. is taken up by a comfortable lazyback seat extending clear across after end of cockpit, followed by a 2 ft. 6 in. after deck, under which swings the bronze quadrant which controls rudder through a hole about two inches square in the transom. The outboard rudder is the right idea for small seagoing boats, giving instant control with a touch of the wheel, and with small strain on the stearing gear. Under this after deck is a big locker space, of which there is never too much on a small boat.

The engine, a two-cylinder, two-cycle Erd, with 4 in. x 4 in. cylinders, rated at ten h.p., turns a 15 in. x 20 in. two-bladed speed propeller 1,000 r.p.m., and at that speed gives the boat a speed of 14 statute miles per hour with two people and all equipment aboard, and engine muffled. The propeller slip is about 25%. This engine is installed just forward of the bulkhead, with controls leading to the steering wheel, and with rear starting device on after side of bulkhead, while in pockets on the starboard side of engine compartment will be found all necessary tools. The engine is oiled by grease cups on the main bearings, while the rest of the engine is oiled by high-grade cylinder oil placed in the gasoline. After running the boat about six hundred miles, I took the engine down, and found it in perfect shape, a fine film of oil on all working parts, no gummed oil anywhere, and not enough carbon in both cylinders to fill a thimble. The whole engine compartment is ventilated by a syphon ventilator that really ventilates, while, by the insertion of the removable bulkhead and one padlock, the whole space under the forward deck is locked up, and protected from the sneak-thief.

Erd III maintains a speed of 14 miles an hour with a motor of but 10 h.p.

The electrical current for both lights and ignition is furnished by two 6-volt, 80 amp. storage batteries controlled by the kick switches on bulkhead. All wiring is the best primary cable obtainable. The ignition system is of the waterproof, jump-spark kind (Perfex), and has not given any trouble. The batteries are so wired that the current from No. 1 flows through the coils, vibrator and plugs in the opposite direction to that from No. 2, resulting in a redepositing of metals, and a freedom from pitting at vibrator and plugs. The lighting system consists of running lights, binnacle and gauge light, light in motor compartment, trouble light and 20 c.p. searchlight, all fitted with Tungsten bulbs to reduce current consumption, and last, but not least, an electric cigar lighter. The batteries supply ample current for the above, and are, in fact, recharged only every six weeks to two months, making that part of the expense very light.

The gasoline is carried in the large tank under operator's seat, and from there is forced by three pounds air pressure to a three-galoon tank over engine; this tank has glass steam gauge to show gas in tank, and from here the gasoline flows by gravity through a strainer and filter to carbureter. The air pressure is supplied by an air-pump, working on engine flywheel, and which also blows whistle; for emergency use there is a hand-pump fastened to coaming at operator's left hand.

For sleeping the bulkhead under after seat comes out, giving a clear space 4 ft. x 7 ft., which can be filled in with the boat's cushions, making a good berth for two (I have slept three there). For those that require more headroom in the "cabin" than furnished by the cockpit cover buttoned over the coaming, an auto-top makes an ideal

(Continued on page 67)

Planning a Propeller.

The Fundamental Principles of Propeller Design Reduced to the Simplest Possible Terms. A Practical Method Used in Laying Out the Screws for a Number of Prominent Boats.

Part II.

By Henry C. Wright.

IN my article in the December issue, I divided the uses of small propeller wheels into four classes, namely, those for heavy cruisers, light cruisers, runabouts or semi-speed boats, and lastly speed boats. Each of these types has its own peculiarities of design, and in order to refresh the reader's memory, I will state briefly the main features.

For heavy cruisers I suggested using large expanded blade area, low pitch, and having the blade tipped back about 9° or 10°. For the other extreme, or say for speed boats, I suggested smaller blade areas, higher pitches and the blades normal to the center line of shaft. It will be seen that the expanded areas and rake back of blade decrease as the wheels approach the speed types, while the pitches increase. It should also be noted that the shape of the expanded blade area for heavy cruisers is nearly circular, which shape approaches the ellipse for speed wheels.

In order to demonstrate these features, the accompanying illustration will show more clearly than any description the four types of which I have spoken. The expanded areas are approximately 58%, 51%, 45% and 39%, whereas the pitch ratios are 1.0, 1.1, 1.2 and 1.3 respectively. All of the wheels are laid out right hand and designed for Monel Metal and proportioned so that the shaft diameters and hub diameters are about the same, as will be seen by comparing the various cuts.

There are some features, however, which are the same for all wheels, viz.: the tips of blades are ground to a knife-edge on the back side of blade; each blade is planed to a true screw on the driving face; the wheels are polished all over, and one key is used in each case. The shaft taper is about the same or about ¾" in diameter to the foot. Each hub is fitted with a cone-shaped nut which is screwed on the shaft with a spanner and locked in place by having a countersunk screw tapped half in the nut and half in the hub, when the wheel is in place on the shaft.

The pitch of any wheel can be measured in a simple manner, the method of which I will now explain. Describe the arc of a circle, equal to about half the radius of wheel, on a piece of paper and lay off an angle of, say, 30°, having the limiting radii intersecting the circle at points X and Y. Lay the wheel on this paper, having the center corresponding with the center of hub, measure the normal distance from points X and Y to the blade. The difference of these two dimensions multiplied by 12 will equal the pitch in inches at that radius. In plainer terms, if a wheel advances a distance X in one-twelfth of a revolution, the pitch, by definition, is equal to the product of the two, or $12X$.

In practice, a so-called pitch-board is given the pattern-maker for checking up his wheel. This consists of a right triangular templet of plate, having for its dimensions: altitude equal to the radius of the wheel and the base equal to $\frac{P}{2\pi}$, as explained in the foregoing article. The hypothenuse is a straight line and the angle opposite same a right angle. In order to use this board, the base is placed on the circumference of a circle of the diameter of the propeller. In this way the driving face may be checked up. There are many wheels which are complex in their character and more details of lifts, etc., must be given, but the foregoing methods of measuring wheels will be accurate enough for all true screw wheels with a constant pitch. It naturally follows that wheels having variable pitches can only be measured by repeating the operation for various radii.

If one examine the sections at the various radii, as given in the first article and also in the illustrations in this number, it will be seen that the thickness is put on the back side of the blade so as not to interfere with the true helix or driving face. This is good practice for small wheels, but various other sectional shapes have also given good results. The advantage, however, of using this shape is in the fact that it is an unusually strong section and therefore light, and does not destroy the true face. Another important strain is to be guarded against and that is due to the angular force of the water on the blade, thereby causing a twisting strain on the latter. This has been demonstrated to occur near the leading edge or the greatest twisting moment is about

one-third the width of blade. Naturally it follows that the greatest thickness of blade should be opposite this point. In practice this feature is incorporated in the design. In general it may be stated that the aim of the designers is to place the greatest amount of metal opposite the largest stresses, but always bearing in mind that by uniformly increasing or diminishing the metal gives greater continuity of strength without making any part unusually weak.

It has been the writer's aim to confine himself to the design of blades for solid propellers, as they are superior in some ways to reversing wheels, which are only used to best advantage on auxiliary sailing vessels where it is necessary to twist the blades so that they offer the least resistance to the water when the boat is under sail. Reversing wheels are used, too, on many launches where the conditions of installation do not allow the use of a reverse gear. Solid wheels are lighter, stronger, and usually a little more efficient than reversing wheels, for the reason that the pitch remains the same and is not an uncertain quantity, as on a slightly worn reversing type. Hubs of reversing wheels are necessarily larger to accommodate the machanism and therefore offer more resistance. Reversing wheels are in many cases necessary and can be used to best advantage in high powers in cases where the power to be transmitted is too great for a light reversing mechanism. I am referring to auxiliary installations and also to cases where there is not enough room for a reverse gear. Reversing propellers are in very common use for small powers and many are satisfactory, but there is sure to be wear and tear as in the case of reverse gears. It is good practice to have as many working parts as possible in the boat where they are accessible.

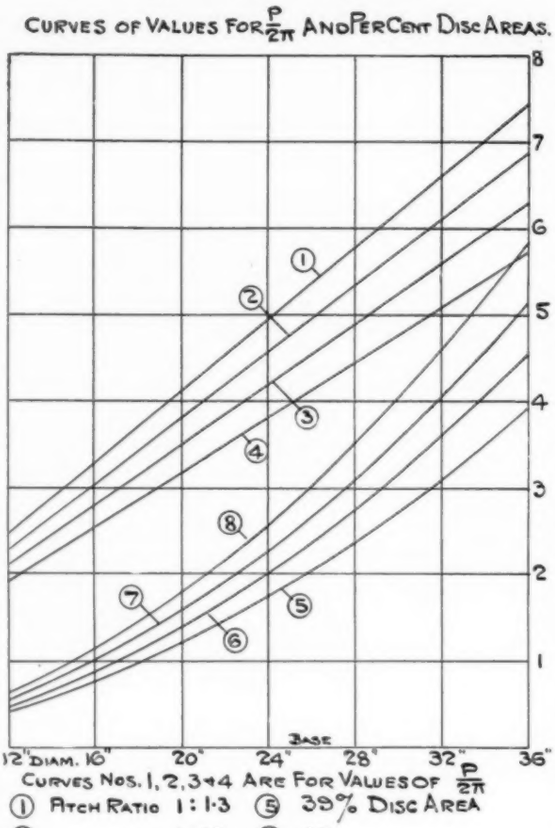
As in my last article, I am indebted for the illustrations to Morris M. Whitaker, who has recently designed a series of propellers for the Biddle Hardware Co.

So far as the design of blades is concerned, the foregoing methods hold good for both solid and reversing wheels and I have endeavored to point out, without prejudice, the features of these two types in a general way and still keep to the subject of the article.

A few remarks describing a few of the characteristics of Monel Metal and manganese bronze will interest the reader at this point. Monel Metal is a natural alloy of nickel and copper, the greater part of which is nickel. It is extremely tough and of great tensile strength. Manganese bronze is an alloy of copper, tin, zinc and a small portion of ferro manganese. Although physical tests are at hand, I think, for the sake of comparison, it is simpler to state the U. S. Government requirements for these two metals, viz.:

Monel metal.—Tensile strength, 65,000; elastic limit, 32,500; elongation in 2 in., 25%.

Manganese bronze.—Tensile strength, 60,000; elastic limit, 30,000; elongation in 2 in., 20%.


CURVES OF VALUES FOR $\frac{P}{2\pi}$ AND PER CENT DISC AREAS.
8
7
6
5
4
3
2
1
BASE
12" DIAM. 16" 20" 24" 28" 32" 36"
CURVES NOS. 1, 2, 3 & 4 ARE FOR VALUES OF $\frac{P}{2\pi}$
① PITCH RATIO 1 : 1·3
② " " 1 : 1·2
③ " " 1 : 1·1
④ " " 1 : 1·0
⑤ 39% DISC AREA
⑥ 45 " " "
⑦ 51 " " "
⑧ 58 " " "
FOR READINGS OF CURVES 5, 6, 7, 8 MULTIPLY BY 100.

In designing a series of propellers their characteristics may be read from these curves.

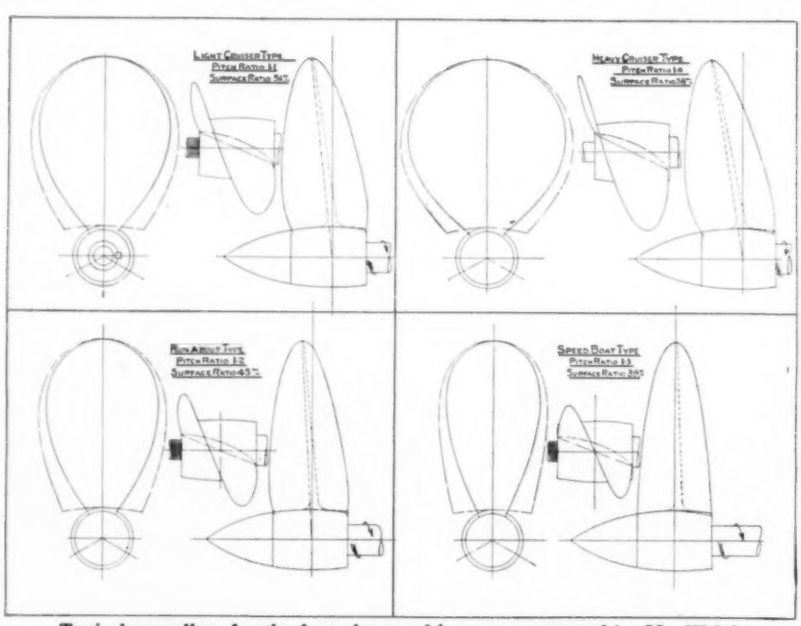
DESIGNING A SERIES OF SIMILAR WHEELS.

The construction of a series of similarly shaped wheels can be best accomplished by drawing a number of curves of the various elements to be incorporated in the design. With this result in view, the accompanying curve sheet will demonstrate the argument. As will be seen, the base is laid out for diameters of wheels from 12" to 36", and with ordinates in terms of inches. In order to avoid complications, only eight curves are shown, which are applicable to the four series which have been spoken of repeatedly in this discussion. These curves relate to the pitch and the surface ratio.

In order to arrive at these curves, I would suggest designing four hubs and wheels, say for diameters of 12", 20", 28" and 36". All of these hubs should be designed so as to belong to the same series, but great care should be used to have each hub of proper dimensions to suit all the probable uses to which it would be placed, such as the proper shaft diameter, length, etc. In order to find the length of the various hubs, the strength of the blade at the root should be figured from the horsepowers and revolutions at which each wheel is to operate. If we now assume that our pitch ratios are 1.0, 1.1, 1.2, and 1.3, with surface ratios of 58%, 51%, 45% and 39%, as I have considered in this article, it follows that we have four wheels of arbitrary diameters, say 12", 20", 28" and 36". Values of the disc areas may now be worked out by using the formulæ $\pi R^2 - \pi r^2$, where R is the radius of the wheel and r is the radius of the hub and $\pi = 3.1416$. By multiplying by the percentage required for each diameter and each of the four series, values may be obtained and plotted for the curves Nos. 5, 6, 7 and 8 in the curve sheet. By using these curves, any surface ratio can be read at once for any intermediate diameter of wheel. The value of $\frac{P}{2\pi}$ can also be readily determined as long as the pitch ratios are known. These values are important for laying out the wheel and are accurate enough so far as the delineation is concerned, but a figured dimension must also be given the builder.

It will be seen that curves could be constructed for all the various dimensions for a series of wheels, such as curves for length of hub, diameter of hub at center line, diameter of shaft, thickness of blades at root and tip, also width of the blade at root. If these curves are followed closely, a series of beautiful and efficient wheels can be designed, which would incidentally greatly reduce the labor, so far as drawing is concerned. Similar remarks can be made concerning the shapes of a series of blades of different diameters but having the same surface ratios. In these cases separate each class of blades and draw the four expanded outlines on the same paper, using common shaft center. By using proportional dividers, the intermediate expanded outlines having correct areas can be determined. These lines will all show a great similarity so far as the location of the greatest width of blades, etc., is concerned.

The method of using curves for determining various elements of a series of wheels is superior to any other method and is considered the best practice. It must be borne in mind that there are many wheels which are of a special character, due to extraordinary circumstances of use or to special stresses



Typical propellers for the four classes of boats as suggested by Mr. Wright.

which are encountered. Special wheels must be designed separately. The foregoing methods of delineation will hold for almost any case except where it is necessary to project the true pitch line of the helix. As nearly all patterns can be made without projecting these true pitch lines, it holds that the latter is of very little use. In some cases of feathering propeller wheels, where the actual shape of the parts of which the pattern is made has to be given the patternmaker, the latter method is necessary.

It must be noted that in the foregoing argument only symmetrical blades were considered. If the two halves are not alike, the process can be repeated for the other half, which slightly lengthens the operation. Only unusual conditions should warrant the design of an unsymmetrical blade, such as increasing blade area aft to increase efficiency, as in sailing vessels where the sternpost will not alow a regular wheel, or the sternpost is so large that the clear flow of water is greatly impaired; again, in cases where the wheel is to be used where there is seaweed or marsh grass. In such cases the leading edge of the wheel is shaped as a spiral so as to throw the grass off. The criticisms of this type appeared in the December number of MoToR BoatinG.

ON TRIAL TRIP PERFORMANCE.

It is necessary to give the reader an insight into the method of determining the suitability of a screw to a boat. By far the best method is to run a progressive trial trip over a measured course, preferably a statute mile, as computations for smaller boats are based on the miles per hour. The boat should be run over the course, say three times at each different speed, which should be at regular intervals between the lowest constant speed and the highest possible constant speed. The actual time over the course should be accurately measured with a stop-watch for each run. The number of revolutions of the engine should also be carefully recorded by a revolution counter or some similar means. The displacement and trim should be measured if possible to see that the boat is performing according to her design.

With the above figures carefully worked out and the mean values tabulated, a series of curves could be constructed showing the revolutions of engine for any speed, the speed horsepower curve and the curve of the slip per cent. of the propeller for any speed. If the slip is excessive then by enlarging the blade area and slightly reducing the pitch, a better result would be acquired. One fact is always of paramount importance and that is the designed speed of the engine. Therefore, in laying out a new screw it is of the greatest importance to compute a propeller suitable for a certain number of revolutions of the engine.

It has been my object to point out the elements of design of a propeller without tiring the reader with many necessary mathematical calculations, and, if that end has been attained, my object is consummated.

The Sturdy Motor Lifeboat.

Continued from page 15.

sulting in the saving of thirty lives. Another characteristic experience is told in the following letter:

13th District,
Baaddah Point Station, Wash.
April 18, 1911.

Hon. S. I Kimball,
General Superintendent Life-Saving Service,
Washington, D. C.

Sir:—

I feel it my duty to respectfully report to you the wonderful run made by the power lifeboat Constant, of this station.

By request of Dr. C. L. Woods, Superintendent and Physician of the Makah Indian Reservation, we manned the power boat and took him to attend F. E. Bartram, Government Teacher, who was critically ill at La Push, which is forty miles south of station on the weather beach.

When we left, 1:30 p.m., the sea was increasing, wind about 3, S.W. On arriving at the place found it very rough and the only chance to land was to run under the lee of James Island (a high bluff extending out into the ocean about 200 yards) where Indians were waiting with a large canoe to take the doctor ashore.

In order to get there we had to go through a very heavy surf. I do not think any small boat could have lived, except a power lifeboat.

The Indians took the doctor ashore and returned in about half an hour with the sick man and his wife. The doctor thought it best to take him to a hospital for medical attention, as he could not stay away from his office.

The sick man was well wrapped in blankets and oil coats, placed under the hood on a mattress, where he was kept dry. The doctor said if he got wet it meant death.

We left about 8:30 p.m. The wind had changed to N.W., the sea had increased, so we had head sea both ways. Arrived at the station about 3:30 a.m., 13½ hours' running. The woman was taken ashore so as to get dry clothing. We put gasoline and lubricating oil on board so as to make the run to Port Angeles. There were no tugs or steamers at Neah Bay.

We left station at 5:30 a.m., arrived at Port Angeles 1:30 p.m. The sick man was taken at once to the hospital. As the boys were very tired, we went to a hotel and had a rest.

Overhauled and cleaned engine next morning, left 10 a.m., arrived at station 7:30 p.m.

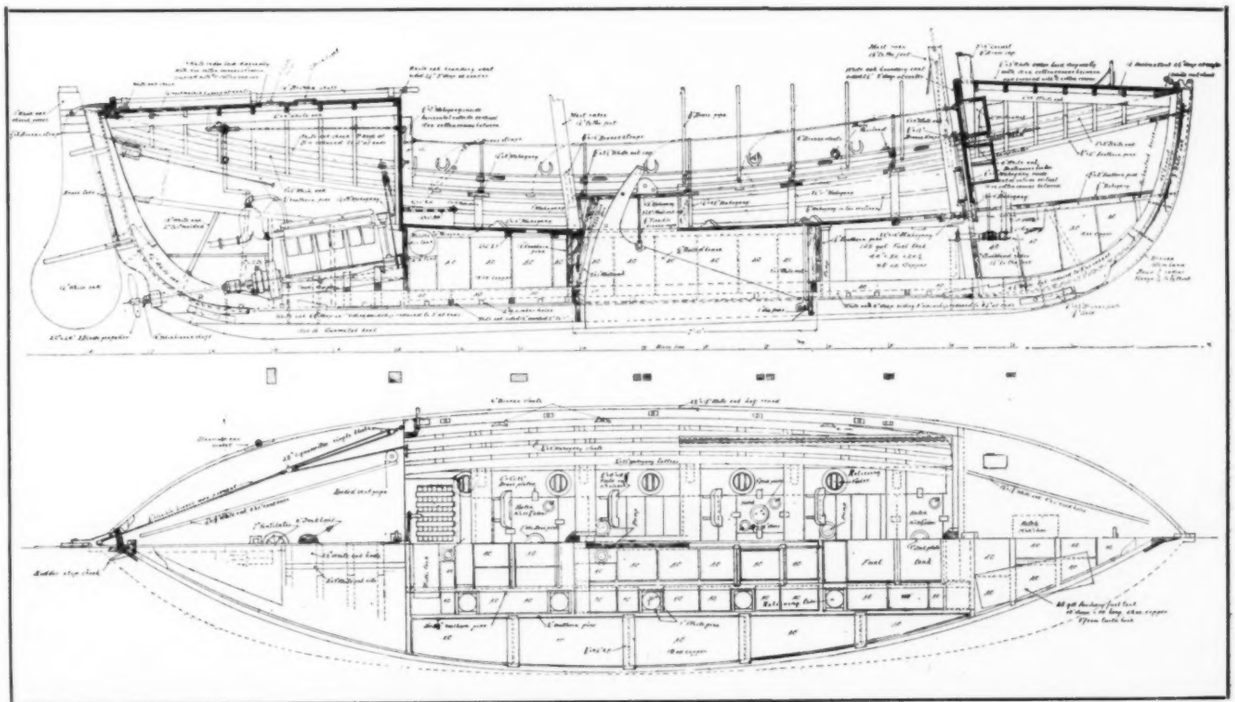
I am sure that no other type of boat could have made the trip. There were fourteen halibut schooners weather-bound at Neah Bay at the time.

The engine never missed once and it started up next day and ran in perfect condition. We ran a distance of 200 miles.

Too much credit can not be given Dr. C. L. Woods for making such a trip.

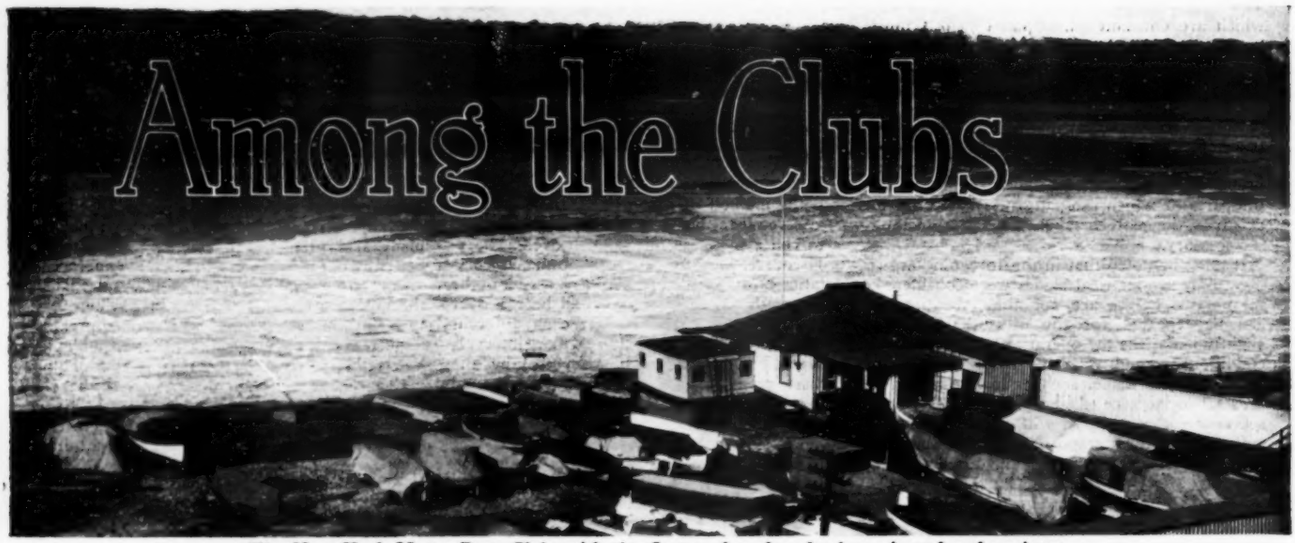
Respectfully,
(Signed) GEORGE W. MCAFEE, Keeper.

These are but a few instances of any number that might be cited to show how admirably these boats are adapted to their service.



The design of one of the new 36-ft. motor lifeboats perfected by Capt. McLellan and described on pages 14 and 15. The motor is a 35-h.p. Holmes.

Among the Clubs



The New York Motor Boat Club, with the fleet gathered under her wings for the winter.

The **Atlantic Yacht Club,** at their annual meeting held in the Waldorf-Astoria, New York City, December 11th, elected J. Stuart Blackton commodore for the coming year. Mr. Blackton is rear-commodore of the Motor Boat Club of America and a member of the Crescent Athletic and other clubs. He owns the racing boat Vita, Vita Second, Viva and Mosquito and the cruiser Paula. Other officers elected at the meeting were: Vice-commodore Willard U. Taylor, auxiliary schooner Adrea; rear-commodore, Arthur W. Teele, motor boat Arval; trustees, Chas. B. Ludwig, Wm. H. Barnard, J. W. Copmann; secretary, Edw. I. Graff; treasurer, T. H. Hart; membership committee, Chas. B. Ludwig; chairman, Herbert L. Jones, Kenneth Lord; nominating committee—yacht owners—Francis M. Wilson, Geo. P. Dillenback, W. Hunt Hall; non-yacht owners, Chas. M. Lindley, Max Grundner, Walter H. Sykes, Jr.

The **Larchmont Yacht Club,** Larchmont, N. Y., at its annual meeting December 6th elected the following officers for the coming year: Commodore, Leonard Richards, steamer Carola; vice-commodore George M. Pynchon, sloop Istalena; rear-commodore, Francis M. Wilson, power yacht Sumida; secretary, Frank Hardy; treasurer, R. E. Robinson; R. Floyd Clarke and R. J. Schaefer were elected trustees to retire in 1915. The constitution was amended providing for the admission of women yacht owners as club members with limited privileges.

The second annual meeting of the **Great Lakes Power Boat League** was held Saturday evening, November 11th, at the clubhouse of the Detroit Motor Boat Club, Detroit, Mich. The following officers were elected: G. H. O. Pook, R. H. Y. C., Commodore; P. C. Jones, M. R. Y. C., Vice-Commodore; A. Y. Gowen, L. Y. C., Rear-Commodore; W. F. McGiverin, R. H. Y. C., Secretary-Treasurer; Guy Judd, R. H. Y. C., Measurer; Joseph C. Murphy, R. H. Y. C., Fleet Captain. It was decided to hold the 1912 regatta at Hamilton, Ont. probably from the 3rd to 5th of August. The following delegates were present at the meeting: H. D. Elliott, B. L. C.; Geo. T. Bliss, Erie Y. C.; P. C. Jones, M. Y. R. C.; Geo. Dietz, C. P. C.; R. E. Power, L. Y. C.; E. H. Croft, L. B. C.; H. B. Greening, R. H. Y. C.; Geo. W. Graves, D. M. B. C.

The **Norristown Motor Boat Club,** Norristown, Pa., held its second annual banquet on the evening of Wednesday, November 15th. John H. Rex acted as toastmaster. Speeches were made by Commodore Crusin and Vice-Commodore Fields of the Flat Rock Motor Boat Club, and Dr. Eugene Swayne, of Flat Rock and the Philadelphia Yachtsmen's Club, who were the special guests of the evening. Remarks were also delivered by Commodore Parker, Vice-Commodore Thomas, Peter V. Hoy, T. J. Jameson, V. S. Nyce, William Jackson, John Leitenberger and Van Peacock.

The **Akron Launch Club,** of Akron, O., at its combined election and smoker held on November 21st, elected the following officers: Commodore, H. F. Maranville; Vice-Commodore, B. P. Hopkins; Fleet Captain, F. W. Brown; Secretary, J. P. Colwell; Treasurer, E. B. Gill.

The **Hudson River Motor Boat Club,** of New York, held its third annual dinner at the Geneva Club, 236 West 43rd St., on the evening of Dec. 9th. Preceding the dinner an election was held, at which the following officers were chosen for the coming year: Commodore, Spetland; Vice-Commodore, H. Alexander Johnson; Rear-Commodore, Wm. Israel; Corresponding Secretary, Frank Pratt; Financial Secretary, Arthur Haas; Recording Secretary, Wm. Stewart; Treasurer, John Gasser; Governors, Frank D. Gheen and George Vestner. Mr. William Brady, American representative of the International Athletic League, acted as toastmaster. The following prominent guests of the club made speeches: Commodore Moran, of the Jamaica Bay Yacht Club; Commodore Reed, Commodore Clarke, of the N. Y. M. B. C.; Commodore-Elect Selden, of the N. Y. M. B. C.; Commodore Vestner, President of the Water Way League of New York; Commodore Frelloehr, of the H. R. M. B. C.; Commodore Stilling, of the Hudson-Fulton M. B. C., and the Commodore-Elect. The evening was completed by the award of 25 prizes won during the past season, the most notable of which were the awards to Mr. Frank B. Gheen, owner of the Kitsix, and Mr. Clement Firth, owner of the Bunk III.

Some Interesting Statistics.

The regatta committee of the New York Motor Boat Club has issued some interesting statistics covering the racing season of 1911. The club has held 15 racing events, in which a total of 157 boats have competed, making an average of about 11 for each event. The total mileage covered by the competing boats has been 10,096, a distance equal to four times across the Atlantic, or nearly half way around the earth at the equator. It has cost the club less than 3¢ per mile to conduct this enormous mileage, which is less than the owners paid for gasoline consumed while racing. Eight hundred persons made up the crews on the boats in these races and assuming an average speed of eight miles per hour, the total time consumed has been 1,260 hours. This is equivalent to 158 days, or 6 3/10 months in 8-hour days. Reducing this further, the committee gets 2 6/10 man years and 50,480 for the total man miles covered, more than twice the difference around the earth at the equator, and about one-fourth the distance from the earth to the moon. This has been at a cost to the club of but one-half of one cent per man per mile of racing.

The **Sheepshead Bay Yacht Club,** of Sheepshead Bay, N. Y., met on the evening of November 9th and at an exciting election chose the following officers for the coming year: Commodore, William Van Waardt; vice-commodore, H. M. Jackson; rear-commodore, P. R. Faribault; secretary, A. A. Scharbius; treasurer, Fred W. Shepherd; members of the board of governors, C. I. Crocker, H. G. Gleistein, E. C. Schiffmacher, J. Healy and Kenneth Morle. Dr. Alec N. Thompson was chosen fleet surgeon.

The **Pistakee Yacht Club,** of Pistakee Lake, Ill., held their annual banquet on November 20th in Chicago, where the following officers were elected for the coming year: Commodore, Chas. E. Carson; vice-commodore, Wm. P. Lawton; rear-commodore, John J. Duffy; fleet captain, Harry Hoff; secretary, Frank L. Pasadeloup; treasurer, Fred L. Wilke; judge advocate, Wm. A. Small; fleet surgeon, Dr. G. W. Reinhardt; fleet chaplain, A. X. Schmidt. Directors were chosen as follows: James A. Pugh, Frank B. Edelmann, Fred L. Wilke, John H. McKay, A. R. Beck, Joseph F. Hans, Senator William Lorimer, Chas W. Peters and Andrew McAnsh. A vote of thanks was extended to James A. Pugh for his work with his racing power boat Disturber II.

The **Motor Boat Club of America** met on the evening of December 7th for their annual dinner and installation of officers. Commodore Melville acted as toastmaster and among the speakers were August Heckscher, J. Stuart Blackton, Henry R. Sutphen, Clifford B. Harmon and Colgate Hoyt. Clifford B. Harmon told of his experience in flying across the sound during the races at Larchmont a year ago. He was presented with a silver loving cup for his achievement. Mr. Blackton and Mr. Hecksher complimented the Crane brothers who designed and built the motors of the Dixie IV which defended the British International cup so successfully. Prizes were presented to successful contestants in the races held last year, among them the silver bowl, known as the International One-Mile Record Trophy, donated by Otto H. Heins and won by the Dixie IV at Huntington Bay on September 9th. At this meeting the following officers were installed: H. H. Melville, commodore; vice-commodore, F. K. Burnham; rear-commodore, J. Stuart Blackton; secretary, P. Morley, and treasurer, Chas. Francis. Trustees: Albert E. Smith, J. M. Shaw, Frank J. Gould, H. R. Sutphen, August Heckscher, M. M. Whitaker, T. F. Chesebrough, Samuel Cochrane, J. H. Hoadley and W. H. Barnard.

The **Muskegon Yacht Club,** of Muskegon, Mich., was organized on November 11th with Harry Nelson as Commodore. Headquarters were located at the Muskegon Country Club's boathouse.

At a meeting held early in November, at the Hotel Imperial, the **Ambrose Channel Yacht Club** was organized with a membership of nearly 50. The club has secured the lease of a pier and a clubhouse at Bath Beach, Brooklyn, N. Y. Officers were elected as follows: Commodore, Sherman P. Camp; Vice-Commodore, M. Fagans; Rear-Commodore, Richard Flegel; Fleet Captain, E. Steffens; Recording and Corresponding Secretary, George D. Wayre; Financial Secretary, James C. Woodruff; Treasurer, John Nulty; Trustees: Arthur Barlow, Chas. F. Brown, and Ernest Flegel; Chairman of the House Committee, Elmer Wollin.

From Motor Boating Readers.

A Department for the Exchange of Ideas and the Discussion of Questions of General Interest. Editorial Opinion on a Number of Questions Submitted by Readers of the Magazine.

MoToR BoatinG's columns are open to its readers, not only for asking questions, but for placing before other readers ideas, results of experience, opinions, etc., that should be interesting or helpful to them; but the editor will not, of course, be responsible for any opinions expressed or statements made in such communications. The name and address of the writer must necessarily be given in every case to make an answer by mail possible (no anonymous contributions will be considered for publication), but names will be omitted in publishing the letters and answers where desired, in which case it is desirable that initials or other distinguishing signature be appended. Through the correspondence department readers of the magazine may be of direct aid to one another in solving the problems of motor boating.

Overloaded the Motor.

To the Editor of MoToR BoatinG, *Sir:*—

Last summer I finished my 25 ft. semi-speed boat built from Brooks' plans with their knock-down material. The boat has 4 ft. 6 in. beam, fine lines forward and flat stern, being almost as wide aft as amidships. The bow is of the narrow, deep style. The material is fairly light, planking ½ in. cypress and everything else in proportion. My engine is a three-cylinder 4 x 4, supposed to run at 900 to 1,000 r.p.m. and develop 20 to 24 h.p. The propeller is a Roper Safety, 16 in. diameter, pitch 24. I find that the engine will not run faster than 750 r.p.m. and runs best with the throttle half closed; opening it more seems to choke the engine. With the engine running 750 r.p.m. I make about 13 miles per hour. What is wrong that the engine does not develop its full power? I might mention that I am running all the cooling water into the exhaust pipe 6 in. aft of engine; could this have any effect?

M. B. C., New Orleans, La.

[It is doubtful if your motor would give under the most favorable conditions more than sixteen or eighteen horsepower at nine hundred or a thousand revolutions. Assuming that you have tried all possible adjustments with which the carbureter is provided, the symptom you speak of would seem to be due to an overload on the motor.

Under conditions of heavy load and low speed almost any motor will run as well with the throttle half open, as the low gas speed resulting in such a case is not raised high enough by the reduced area of the throttle to increase the vacuum to any extent. Probably a smaller carbureter at seven hundred and fifty revolutions would give maximum power with wide-open throttle.

At the present speed the conditions probably call for an adjustment beyond the limits of the carbureter you have.

The circulating water in the exhaust pipe would not cause trouble unless it backed up into the engine; getting into the base through the ports. In the base it will cause almost any difficulty imaginable. It would be easy to test your installation by running for a while with the exhaust pipe disconnected, after carefully draining the base.

Reversible propellers secure delicacy of control without the complication of reverse mechanism, but are not generally considered as efficient as solid wheels, especially at high rotative speeds. This is due in some measure to the comparatively large hub. You would possibly get better results from a solid three-blade propeller, say sixteen inches diameter and twenty-two or twenty-four inch pitch.

Under the circumstances thirteen real miles an hour seems a very fair performance, and fifteen miles about the best you can expect with the motor you have.]

Back Firing.

To the Editor of MoToR BoatinG, *Sir:*—

I have a Toledo engine, 4½ x 4½, rated at 12 h.p., which was to drive a B. & B. 18 x 24 in. wheel, 700 revolutions a minute, which it did not do. I cut the wheel down to 16 in. and the best I can get out of it is 400 revolutions. It back-fires all the time, or rather base-fire. It does not come out of the carbureter, which is a Brice 1¼. It will run for a few minutes and then base-fire sharply. The boat is 23 ft. long by 4 ft. 10 in. wide, of the Brooks model, drawing 10 in. forward and 30 in. aft. Engine, clutch and shaft are in line so I can turn it easily by hand. My wires are all put in grooves in wood and screwed to side of boat and are all best waterproof cable, and use a Vesta 6-volt and 80 amps. battery.

H. B. G., Madison, Wis.

[Back-firing in a two-cycle motor is almost invariably caused by a slow burning mixture, combustion not being completed by the time the piston uncovers the ports for a new charge. In most cases the mixture is too weak, rather than too rich. This may occur from a variety of causes that have no connection with the carbureter, such as poor gasoline, obstructed fuel pipe, insufficient head, air leaks in base chambers, etc. Your wiring system is evidently well installed, and as back-firing is evidence of too much ignition, if anything the only way it can be implicated in your case is by a short-circuit between the two contacts of the commutator. The writer has seen ignition systems where a large and a small spark was produced in two adjacent coils, the first directly and the second by induction, at every contact of the timer.

There may be a slight projection on the head of the piston near the inlet port that acts as an igniter when heated by a few minutes running, and fires the incoming charge.

Assuming that you are familiar with the usual fuel and air adjustments of your carbureter, and that the trouble does not lie there, we would suggest that the cylinders be removed, the pistons examined for projections, the joints of the base chamber gone over for air leaks, and the quality of the fuel and the regularity of its supply when the engine is running tested.

At the point of ignition in one cylinder, the other is near the bottom of its stroke, and the incoming charge might be ignited while the ports were still open, by induction from the other cylinder.

If seven hundred revolutions is the normal speed of your motor, we would suggest that a propeller of less diameter and pitch might be an improvement. It is hard to determine propeller proportions in any case, and doubly so with so little data, but one of sixteen-inch diameter and twenty-inch pitch should show better results. After a propeller is once made, very little good can be done by alteration of its size or pitch.]

What Wheel and Speed?

To the Editor of MoToR BoatinG, *Sir:*—

I have a 4-cylinder, 4-cycle, 6″ x 6½″ Mercury engine which I wish to install in a 40′ cruiser, 9′ 6″ beam, 2′ 6″ draft, of very easy lines. The engine is rated at 60 h.p., 800 revolutions, and can swing a 26″ wheel. Would you kindly advise what wheel, size and pitch you could recommend, and what speed I ought to get with same at 700 revolutions?

Edward Koch, New York City.

[A 4-cylinder, 4-cycle 6″ x 6½″ engine will develop about 46 horsepower at 800 revolutions per minute and 40 horsepower at 700 revolutions per minute. Using 700 revolutions for the basis of a propeller computation we would suggest a 24″ x 30″ wheel if a stock type is to be bought. Considering the revolutions around 700, or, say, 40 horsepower, you could expect about 12.5 miles per hour, a very good cruising speed.]

A V-Bottom for Towing.

To the Editor of MoToR BoatinG, *Sir:*—

I have a 3-cylinder, 4-cycle motor, 4¼″ bore x 5¼″ stroke. I intend to install this motor in a hull 19 ft. long by 5 ft. (V-bottom, Hand design). I want to use the boat for towing. Would you kindly advise me what, in your judgment, would be the proper size wheel to use, also how much power this engine should develop?

R. P. Mathias, Toledo, O.

[The information contained in your letter is incomplete in that it does not state the number of revolutions of the engine nor the possible diameter of wheel which can be fitted. Assuming that the engine turns up 600 r.p.m. it will develop 12 b.h.p. and a suitable wheel for such a boat would be about 20″ diameter x 25″ pitch.]

Best Position for the Propeller.

To the Editor of MoToR BoatinG, *Sir:*—

With relation to the speed of the boat, is it better to place the propeller before or aft of the strut, and what are the reasons for either position? If wheel is placed about 2 ft. from stern on a regular displacement boat without deadwood what result would it have, or is it good practice? How far should the propeller be from bearing and from the rudder?

W. J. M., Manorville, Pa.

[The usual practice of placing the wheel just abaft the strut is by far the best practice except for very high speed boats. In the first place, if the wheel is forward of the strut complications arise in the nature of drawing the shaft and removing wheel, which are not present in the usual case. Therefore, put the wheel aft and design the strut to make a fair-water with the hub. As the turning is dependent upon the velocity of flow by the rudder, place wheel well aft, being sure to allow sufficient room for unshipping same. The difference in speed of the two methods need not be taken into account for ordinary boats.]

The Wheel for a K. D. Cruiser.

To the Editor of MoToR BoatinG, *Sir:*—

Will you kindly inform me what speed I may expect by installing an 8 h.p., 3-cylinder, 2-cycle Palmer engine in a 25′ x 6′ 9″ trunk cabin cruiser, regular lines, transom stern? Also what size and pitch of propeller will give me best results? I am building this cruiser from Monitor Knock-Down frames and am having great success. Am getting many valuable hints from your question contest. Look forward to the arrival of my copy of MoToR BoatinG each month, and file all the answers to the contest; they make a handy reference library on practical motor boating.

J. H. S., Brooklyn, N. Y.

[Your engine will develop 8 horsepower at about 600 to 700 revolutions per minute. If you are going to install a stock wheel, one of 16″ diameter x 24″ pitch would give good results. So far as speed is concerned, from 7½ to 8 miles would be about correct for such a boat.]

Advantages of the Multiplane.

(Continued from page 5)

ORIGIN OF THE HYDROPLANE.

The history of the hydroplane is a matter of record. Quoting Mr. Gielow, "The modern hydroplane is, in its essential features, far from being in any sense of the word a new discovery."

The Rev. C. M. Ramus, of England, in 1872, suggested in a letter to the Commissioners of the Admiralty that the speed of vessels might be increased by making a hull of scow type, as shown by his drawings, with two flat planes, one behind the other and with a step between.

The commissioners replied that the use of planes had been suggested various times before, but there is nothing in the report or any patent records to show that the Reverend Ramus was not the first to suggest the idea of two flat planes connected by a step.

Under the direction of Mr. Froude, an exhaustive series of experiments were carried out, the results showing that the Ramus models had more resistance than ship-shaped ships. Mr. Froude also expressed his opinion that the Ramus type of hydroplane would pound to a dangerous degree in rough water.

In brief, the inefficiency of the Ramus hydroplane was due to *too great a length of planes which did not appreciably reduce the friction area at feasible speeds,* the further because Ramus rounded up the rear end of his planes in such a way that they would drag the water after them.

Ramus likewise committed the same error that the average naval architect makes, when he considers the application of hydroplane principles to large boats; he designed his proposed ship 350 feet in length on the principles of a small racing boat.

Since the date of the Ramus experiments there have been various ideas exposed in patents and some more or less successful experimental work done, but to bring matters down to the "modern hydroplane," which Mr. Gielow says has no "new features," what is the *modern hydroplane?*

Its features as exemplified by the principal boats, would analyze as follows: 1st, a boat having planes of V-shaped cross section and one or more steps; 2d, a hydroplane in which the surface of the front plane merge into the sides of the bow with more or less defined bilge lines, which have considerable inclination; 3d, a hydroplane in which the surfaces of the planes have a greater longitudinal inclination at the sides than at the keel line; 4th, a hydroplane in which the step or steps have a greater depth at the sides than at the keel.

I have the complete printed record and drawings (33 pages) of the Ramus experiments and *not one of these four features* can be found in them.

On the contrary, these are the principal features of the Fauber type hydroplane and were originated by me in France, and the extent to which these features have been employed by well-advertised boats shows how comprehensively the principles of the modern hydroplane were analyzed in my work.

BIPLANES VS. MULTIPLANES.

Mr. Crane, in November MoToR BoatinG, in his article, "The Wherefore of the Hydro," says: "The efficiency of a multiplane is distinctly less than that of a biplane."

To begin with, there is no feature of novelty or invention as between the biplane which Mr. Crane designed and my multiplanes. The biplane was one of the first forms which I considered long before Mr. Crane or Sir John Thornycroft had designed a V-type hydroplane. I fail to see a single example of a biplane racer which shows the efficiency of the multiplane; furthermore, *I do not consider the biplane as safe, as good sea boat, or as easy to handle, as the multiplane.*

The 67-footer Ocoee, designed and built by the Matthews Boat Company for W. S. Milne, of Cleveland, Tenn. She is powered with a pair of 25-32 h.p. Standard heavy-duty motors and has reached New York on her cruise from Port Clinton to Savannah. Her plans and description appeared on page 50 of the December issue.

When Dixie IV beat Pioneer, she beat a last year's boat with a good 200 h.p. less driving power. The maximum brake horsepower of Pioneer's engine is 360. Pioneer's engine was muffled in the races, and further Pioneer is a single screw boat and carries considerable helm and also lead ballast—all of which hurt her speed.

I timed Pioneer six runs over the Admiralty knot at the Isle of Wight, just before her first trip to America and she was doing a fraction under 46 miles in rough water.

Disturber II with less than half the horsepower of Dixie IV and only a 32 ft. hull was able to follow through the wake of Dixie and Pioneer in a rough sea, in a fashion that leaves no room for the expert to criticise the multiplane prinicple.

BIPLANE CHARACTERISTICS.

One of the characteristic features of the biplane, is that the step must be located near the middle of the length of the hull. This increases the overhang of the forward end, or, as one would say in automobile or bicycle parlance, it shortens "the wheel base," to an extent that is dangerous under certain conditions. *An unbroken surface in contact with the water and sliding over the water at high speed is held to the water by atmospheric pressure and its movement will follow the line or plane of the surface.*

In case of the biplane the surface of the planes and particularly the front plane, is lengthened to such an extent and the displacement is moved so far back that if in rough water or in turning, the bow of the boat happens to get a downward inclination, thereby losing its planing angle momentarily, the boat dives, and because of the uneven pressure of the water on the sides of the bow, and influenced by the heeling of the boat and the unbalanced torque of a cavitating propeller, the boat will shear sidewise in an uncontrolable manner, which islikely to produce disastrous results.

In making turns with hydroplanes, they heel inboard because of the leverage of the rudder projecting below the hull. The stern swings out and owing to its inclination the lateral angle of the stern plane causes the stern to lift and the bow to settle. This tendency of the stern to lift when turning is augmented as the bow section is more acute than the stern section.

Fig. 2 shows au example of a biplane at the moment of diving. It will be noted that a great portion of the horizontal area of the front plane, from the step forward, has when diving, a *reverse inclination* of several degrees.

Owing to the high speed the water does not follow freely the "reversely inclined" surface, and as air cannot enter between the surface of the plane and the water, the bow is forced downward by atmospheric pressure. A remedy for this is to shorten the front plane.

The power and influence of "atmospheric pressure" on planes was amply demonstrated in Mr. Froude's experiment with the Ramus model. Ramus rounded up the rear end of both the after and forward planes, as shown in Fig. 3. At times the model would run supported entirely on the stern plane with the center of weight overhanging in the position shown in Fig. 3. This was caused by the atmospheric plane, as indicated by the arrow D, the overhanging weight of the boat being carried by the dynamic action of the water on the planes at E.

If an offset or the slightest break had been made at the point where the surface begins to round upward, the air could have entered the sharp angle between the rounded portion and the water and then the water would not have followed up around the stern.

Terminating the surface of planes at the rear or even along the sides of a boat in a rounded bilge is likely to make trouble.

New Things for Motor Boatmen.

New Attachments and Accessories That Are Offered to the Man With a Boat. The Month's Production of Devices Designed as Aids to Motor Boating.

[Under this heading will appear each month descriptions and, whenever possible, illustrations of the various devices designed to add to the pleasure and comfort of motor boating which have been brought out since the previous issue. It should be kept in mind that the department in any one issue is, as it were, only one month's installment of the many useful things on the market, and that it will be well to consult the previous issues of MOTOR BOATING, which will form, together, a very complete illustrated directory of the things the motor boatman needs. —In writing the makers of the articles shown, if our readers will mention MOTOR BOATING they will receive special attention.]

Herz Automatic Timing Adjustment.

Upon this page is shown a cut illustrating the device used to test the new automatic timing adjustment supplied with the Herz magneto. On low speeds the automatic coupling shows a change of adjustment even with an increase of 20 r.p.m. of the motor, indicating the extreme delicacy of the instrument. The device itself is applied to the regular type of magneto and consists of two juxtaposed coupling flanges, each provided with six grooves curving outward from the center, the grooves in the two flanges curving in opposite directions. A steel ball is fitted into each of the grooves and these act both as a coupling and as governor weights, so that the slightest variation in the speed of the motor affects the position of these balls.

* * *

X. L. Storage Battery.

Kuehn & Metz, 1926 Broadway, New York City, are marketing an improved type of the X. L. storage battery, the construction of which is designed to overcome the defects common to ordinary batteries and to furnish the maximum amount of service. Hard rubber separators between the elements are used to insure thorough insulation, and a large sediment chamber is provided to prevent short-circuiting. There are also means to do away with creeping and leakage of acid to prevent corrosion of the terminals and the vents are so constructed as to allow a free escape of gases. These batteries can be furnished with hard-rubber jars, with wood cases, or celluloid jars may be made to order. The prices range from $15 to $30, according to size.

* * *

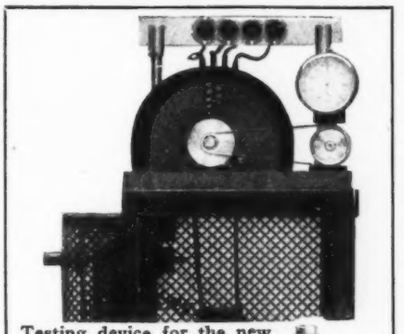
Ball Carbon Remover.

The illustration shows the complete outfit of the new carbon remover manufactured by the Ball Carbon Remover Company, 3416 Baring St., Philadelphia. The outfit consists of a number of balls and tablets of a chemical composition, which in combination with each other effectively remove accumulated carbon from the cylinders of any vertical type of motor. From four to eight balls and six to twelve tablets are used for each cylinder, the only thing necessary being to drop them through the spark plug opening, replace the plug and continue the operation of the motor. The balls and tablets are slowly vaporized by the heat of combustion and there is nothing to be removed from the cylinder, the loosened carbon passing out through the exhaust. This remover can be used without in any way interfering with the operation of the motor and the box, which sells for $1, contains sufficient material to remove the carbon from four to eight cylinders.

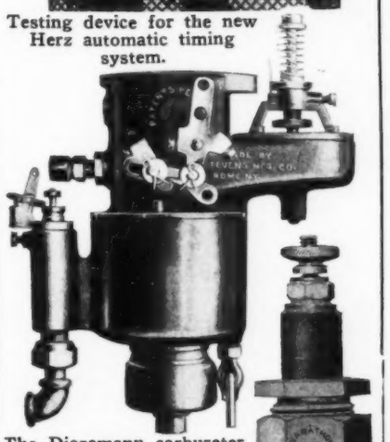
* * *

Marathon Mica Spark Plugs.

A new departure in the ignition field is a mica spark plug, manufactured by the O. K. Mica Core Company, 18 Water St., Brooklyn, N. Y., which is guaranteed to be proof against accumulations of soot and oil and also against short-circuiting. The core of this plug is doubly insulated by a longitudinal mica tube, with mica washers inserted and compressed with a pressure of over 600 pounds, rendering it impregnable against the difficulties sometimes found in plugs. A stone sleeve slips over the lower part of the core and is cemented and baked upon it so that it becomes practically one solid piece. This guard makes the lower end of the core triply insulated and also covers the center electrode, protecting it thoroughly against short circuits. The plug is made in all threads and sells for $1.00.



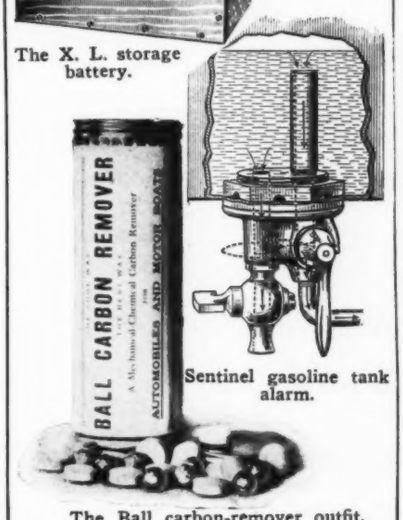
Testing device for the new Herz automatic timing system.



The Diezemann carbureter

The Marathon spark plug.

The X. L. storage battery.



Sentinel gasoline tank alarm.

The Ball carbon-remover outfit.

Diezemann Carbureter.

The Stevens Mfg. Co., of Rome, N. Y., have just placed upon the market a new carbureter known as the Diezemann, which is somewhat different from any other style. It is of the float chamber type, but there are two mixing chambers which run vertically through the center and in each of these is a spray nozzle so located that each is but a slight distance from the exact center of the float chamber. The needle adjustments are made from the top and the nozzles are inclined at the same angle as the needles, but from the opposite sides of the mixing chamber. The throttle is of the double butterfly type, so constructed that it uncovers the top of the first mixing chamber and when that is completely opened, it uncovers the second chamber until, when both are wide open, the air has a clear and unobstructed passageway through the carbureter into the manifold. An auxiliary air valve is provided at one end of the throttle chamber to maintain the relative proportions of air and gasoline after the first mixing chamber has reached its capacity and before the second one is brought into play. This provides a mixture of very high calorific value and an exceedingly flexible control. The price of the carbureter in one-inch size, without a water jacket, is $18. The larger sizes are water-jacketed and range from $20 to $30 in price.

* * *

Clark's Anti-Kickback Crank.

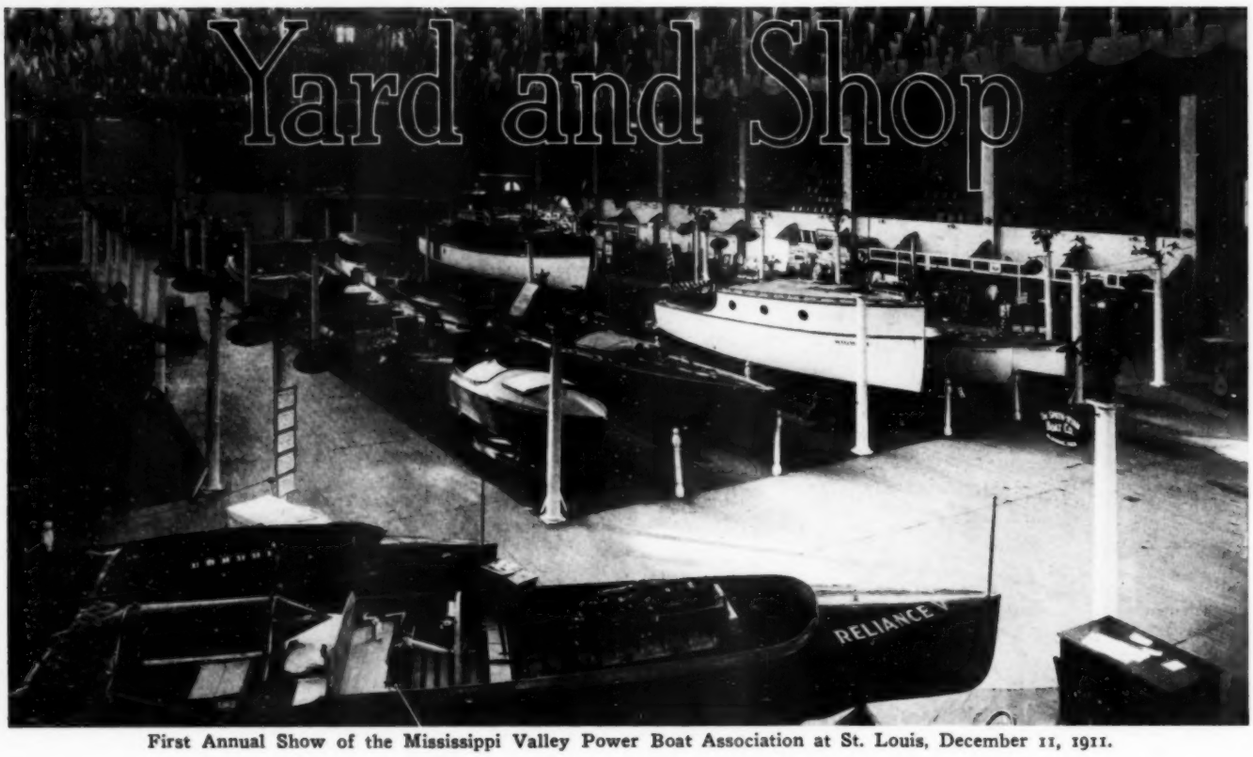
This crank is manufactured by the Jos. S. Herrick Mfg. Co., of Muncie, Ind., and is particularly adapted to use with rear starters attached to marine motors. It operates upon ball bearings and is so encased that no dirt or dust can enter into the working parts and one lubrication is sufficient for a year's run, no matter how often the motor may be cranked. The device is very simple, each part being interchangeable and adjustable to any make of motor. There is nothing to get out of order and if the motor should backfire no part of the crank can be injured. The article is sold for a price of $10, and it can be attached with very little trouble. It requires no particular adjustments when once in use.

* * *

Sentinel Gasoline Tank Alarm.

This is a patented device made by Zwillinger & Feldman, 558 West 171st St., New York City, and is designed to reserve a supply of gasoline in the main tank without the necessity and extra expense of carrying a reserve tank. The quantity in reserve is adjustable according to the fuel consumption of the engine and is so simple in construction that it is practically impossible for it to get out of order. The device consists of a standpipe extending two inches upward from the bottom of the tank through which the gasoline flows, until it falls to the level of the top of the standpipe, when the engine stops. To start the engine again it is simply necessary to give the valve a quarter turn, as shown by the dotted line in the illustration, so that the gasoline flows through the lower outlet for an additional ten miles or so, an amount which may be regulated by the operator. The small cock shown is for cleaning only and acts independently of the other valve. The valve can be operated by a handle, as shown in the illustration, or by key if desired to protect it against theft or loss.

Yard and Shop



First Annual Show of the Mississippi Valley Power Boat Association at St. Louis, December 11, 1911.

Shipyard Changes Hands.

The Downey Shipyard and Marine Company, of 30 Church Street, New York City, announce that they have leased the marine construction and repair department of the Tebo Shipyard, located at the foot of 23rd and 24th Streets, Brooklyn, N. Y., where they will carry on the business of building, dry docking and repairing steel and wooden vessels.

A New Caille Motor.

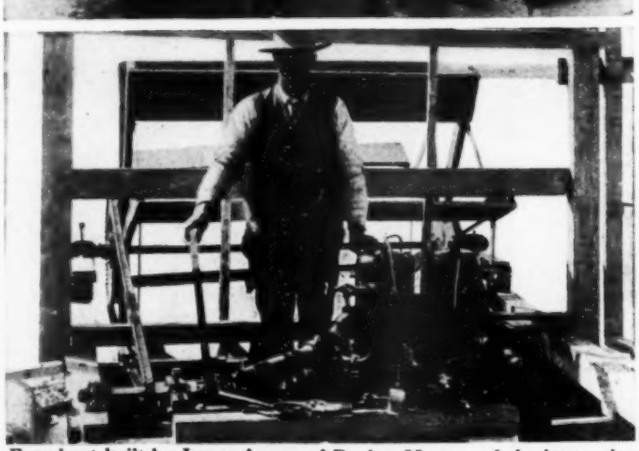
The Caille Perfection Motor Company, of Detroit, Mich., have issued an attractive circular calling attention to their 1912 line of Perfection engines, including a new 8 h.p. heavy duty engine, which embodies some novel features. The engine has an igniter which entirely eliminates coil, timer, batteries, switch and most of the wire, there being only one short length running from the inside of the igniter to the spark plug. With this ignition system it is possible to start the engine on a quarter turn of the flywheel just as if batteries and coils were used. It makes an absolutely waterproof system and is superior to a magneto, as with the magneto it is necessary to start the engine on a battery even with a high tension. Some of the further advantages of the system are, the igniter produces an extremely hot spark of very high voltage for starting, as the strength of the spark is not, as in the case of the magneto, dependent on the speed. Second, it is not necessary to turn the engine over in starting. By simply turning the flywheel a quarter turn, or until the igniter trips, will get a good spark. Third, the igniter is absolutely water and dirtproof and can be used without any protection whatever. Fourth, it is very simply built and does not require any auxiliary apparatus of any kind. Fifth, operates in either direction. The company has already had an 8 h.p. heavy duty on the market, which has been remarkably successful in work boats of all kinds, such as fishermen's boats, ferry and towboats. One of their customers who had two of these engines in Texas, has had them working for the past three years towing logs and says that in that time he has not spent a cent for repairs.

Coming Shows.

Boston, Mass.—January 27 to February 3. Motor Boat and Engine Show under the auspices of the New England Engine and Boat Association, in Mechanics' Building. Address Chester I. Campbell, General Manager, 5 Park Sq., Boston, Mass.

New York, N. Y.—February 17 to 24. National Motor Boat Show in the 69th Regiment Armory, under the auspices of the National Association of Engine and Boat Manufacturers. Address Ira H. Hand, 29 West 39th St., New York City.

Montreal, Canada.—March 23 to 30. First National Motor Boat and Sportsmans' Exhibition in the Arena. Address R. M. Jaffray, Manager, New Freemans Hotel, Montreal, Canada.



Ferryboat built by James Avery, of Poplar, Mont., and the interesting installation of her Gray motor.

New Lighting Installation Plant.

The Apple Electric Company, of Dayton, Ohio, have equipped their Detroit plant at 1005 Woodward Avenue with complete facilities for installing their electric lighting system in automobiles and motor boats. They also have a repair shop in connection with the installation plant for the maintenance of systems already installed.

Famous Naval Architect Dead.

A. Cary Smith, who has long been famous as a naval architect, died at his home in Bayonne, N. J., on the evening of December 8th. Mr. Smith has had a conspicuous place in yachting history. He designed at least one America's cup defender besides schooners, sloops, and yawls that have crossed the Atlantic and for years been consistent winners in races. He designed the steamboats Richard Peck, City of Lowell, and Chester W. Chapin and the yacht Meteor for the Kaiser.

A Home Made Ferry Boat.

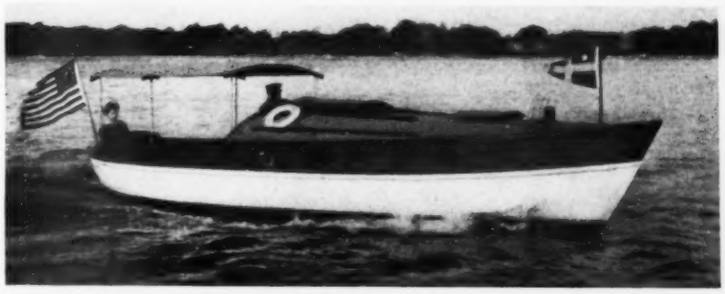
Mr. James Avery, of Poplar, Montana, built a large flat bottom ferry boat in the spring of 1911 to carry passengers and freight between Poplar, Danville, and the Fort Peck, Indian Reservation, Montana. The boat was built of 4 x 4 and 4 x 6 timbers for the frame and finished with one and two-inch planking, and when completed was 40 ft. long, 25 ft. wide and registered to carry 56 tons. The motive power was furnished by a 24 h.p. model "T" heavy duty Gray motor. Mr. Avery charged 25 cents for foot passengers, 50 cents for single and $1 for a double rig, and averaged $40 a day net. The ferry's best day was on July 4th, when it turned in a profit of about $75.

A Lackawanna Announcement.

The Lackawanna Manufacturing Company, of New York, have issued a folder announcing a special offer of their 9 h.p. Lackawanna Reversible 1912 Model Marine motor. The folder also gives a detailed account of the construction of this motor, with numerous diagrams and illustrations. The motor in question is being offered for a limited time at $145.

Big Feat by a Small Boat.

The little gasoline excursion boat Reliance, John Neuman, captain, made a remarkable trip a short time ago, from North Bass Island to Sandusky, Ohio, a distance of 20 miles. There was a strong gale of icy wind blowing, which bore with it a blinding snowstorm, and old lake men declared that they would not have made the trip on the largest boat on the lakes. The Reliance carried twelve passengers, four of whom were women, and two children, besides a cargo of 20 boxes of fish for the Post Fish Company, and a load of furniture. The captain declared that it was impossible to see a thing after the boat left North Bass until they were passing Kelly's Island. The Reliance is 65 ft. long, and equipped with a 45 h.p. Heavy Duty Regal engine.



The trim motor boat Idylease, which Mr. Grush built from Faultless frames made by the Valley Boat and Engine Co., and not Pioneer frames as stated in the December issue.

Dean Company's New Catalogue Out.

The Dean Manufacturing Company, of Newport, Ky., have just issued their 1912 catalogue, showing their line of Fox marine and aero motors. The introduction and description of the parts is enlivened by a number of cuts and sectional views, with a history of the two-cycle motors, including two-port, three-port motors and the Fox four-port accelerator. A new departure for the coming season is a combination of the Fox fourth port with a rotary valve, distributing the fuel to the different cylinders to be used on the Fox De Luxe aero motors. The catalogue has a division of testimonials and photographs of boats equipped with the different motors. A special effort is made to reach the user with information that will be of value in selecting exactly the right type of motor for his own boat. The catalogue contains 30 pages and will be sent on application to the Dean Manufacturing Company.

Record Round Trip.

The speed motor boat Victor, owned by W. S. Dunn, of Portsmouth, and built in Norfolk, Va., added new honors to her long list of achievements by making the trip from Richmond to Norfolk, 115 miles, in 4 hours and 58 minutes, an average of 23 miles an hour. She carried as passengers Mr. Dunn and M. H. M. Bramberry as mechanician. She left Richmond at 1:25 and reached Norfolk at 6:40, the motor running continuously the entire trip. A stop of 10 minutes was made at Upper Brandon to take on two passengers, thus making the actual running time on the return trip 5 hours and 15 minutes. The speed was very creditable, considering that the boat was heavily loaded and not run at full speed because of the desire to save fuel. The actual time of 10 hours and 13 minutes for the 234 mile round trip is, as far as can be learned, the local record for long distance. The hull of the Victor was built by the owner at his shipyard on Scott's Creek and the 40 h.p. 6-cylinder Loew-Victor motor was installed by Wallace Bros., of Norfolk.

New Fairbanks-Morse Marine Engines.

Fairbanks, Morse & Company, of Chicago, Ill., have brought out a new model of engine for 1912, known as type "K." This is a two-cycle, three-port engine, cylinders 5½ in. bore and 6 in. stroke, built in one and two cylinders, developing 7½ and 15 h.p. at 550 r.p.m. Some unique features of the design are found in the exhaust and intake manifolds, also in the outside bypass for water from the cylinder head, which prevents the water from coming into contact with the cylinder head gasket. Back-firing is absolutely prevented. The engine is regularly made with make and break ignition and plunger pump. The engine is designed especially for cabin cruisers, fishing boats and other types of heavy hulls. The other types of Fairbanks-Morse marine engines, which have justly enjoyed so much popularity, will be continued, as follows: The type "E," a two-cycle, three-port engine, 3¾ in. bore, 3¾ in. stroke, 3½ and 7 h.p. at 800 r.p.m. This type is particularly adapted to small runabouts, family type and other light boats. Type "G," two-cycle, three-port engine, built in four sizes, with 1, 2, 3 and 4 cylinders, developing 6, 12, 18 and 24 h.p. at 800 r.p.m. This type is suited to fast and medium speed runabouts, launches, small cruisers and work boats. Type "S," four-cycle, built with 1, 2 and 4 cylinders, rated at 4½, 9 and 18 h.p. at 800 r.p.m. For heavier hulls than the preceding types. Type "B," built in 1, 2 and 3 cylinders, developing 20, 30 and 40 h.p. at 350 r.p.m. Suitable for very heavy service, where long life, high efficiency and dependability are absolutely essential.

Impervo Really Impervious.

It is a great thing and not always a possible thing to be dry (externally) when out in a launch, but that it can always be done if the owner wears Impervo is the claim made by E. A. Armstrong, the manufacturer. Not only that, but it is said to be rubberless and trouble proof. People who have worn garments made of this material say that it is way and ahead of ordinary "oilers."

A Motor with a Good Valve System.

The Frisbie Motor Company, of Middletown, Conn., have a 6-cylinder, 50 and 75 h.p. motor which is worth consideration. It is a good exponent of the advantages in power and economy of the valve-in-the-head type motor. In this engine all valves, together with their seats, are in removable cages, thus making grinding or replacing a short and easy operation, and, if desired, an extra cage which contains the valve seat, can be put in place at once. This is a feature of unusual importance and gives the operator a familiarity with, and immediate control over, the valve system. The Frisbie engines range in size from 3 to 75 h.p. and are made in 1, 2, 4 and 6 cylinders.

McCord Gets Lubricator Company.

The McCord Manufacturing Company, of Detroit, Mich., has taken over the patents and business of the Precision Appliance Company, of Chicago, Ill., and will hereafter manufacture the various well-known types of Hill-Precision lubricators and oiling devices, manufactured by that company in addition to its own line of McCord lubricators. The company has just completed an addition of 12,000 sq. ft. to its factory and 4,000 sq. ft. to its foundry, to accommodate the increase of business.

To Make Solid Propeller Wheels.

The Wilmarth and Normon Company, of Grand Rapids, Mich., makers of the well-known Sintz reversing propeller, have announced that in addition to their regular product they will turn out solid wheels next year in seven different designs suitable for all types of boats.

An Elbridge "Feather-Weight."

The Elbridge Engine Company, of Rochester, N. Y., has added a new "Baby Feather-weight" to its well-known line of "Feather-weight" motors, which is designed especially to meet the demand for a small, compact, vibrationless engine for handsome power tenders. The two-cylinder model will be the standard size, which normally delivers 8 h.p. at 900 r.p.m., but which when run at 1,150 r.p.m. will develop more than 10 h.p. The total weight of the engine fully equipped for fresh water except for the magneto, will be approximately 60 lbs., and with salt water fittings, 78 lbs. The cylinders are 3¾ in. x 3½ in. bore and stroke and the engines are made in 1, 2, 3 and 4 cylinder sizes. The equipment includes Bosch Magneto, Schebler or G. & A. Automatic Carbureter, Rotary Pump, etc.

Detroit Oiler Through Niagara Rapids.

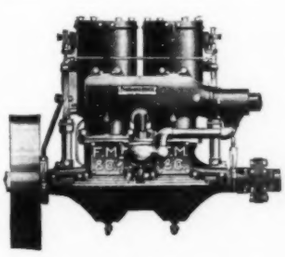
Captain Klaus Larsen took a Detroit Force Feed Oiler through Niagara Rapids with him, installed on his two-cylinder Scripps engine. After the trip, the captain said: "My lubrication did not give me a bit of trouble this year. My Detroit oiler ran as fine as silk."

K-W Ignition Company in New Factory.

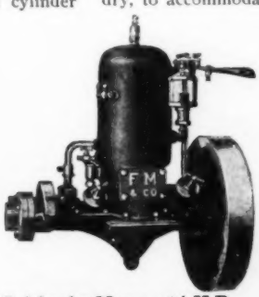
The K-W Ignition Company, of Cleveland, Ohio, has just moved into a new factory at 2845 Chester Avenue, near East 30th Street. The building is of fireproof, steel and reinforced concrete construction, 75 ft. x 165 ft. with over two acres of floor space. The factory is not the only new thing identified with the K-W company, for they have brought out a new model of low tension magneto for marine engines, known as the K-W "Special." The construction embodies the well known K-W principle of stationary winding and revolving motor mounted on ball bearings. There are no moving wires, commutator, brushes or sliding contacts. The current is generated in the winding, which stands still and goes direct from the winding to the binding post at the end of the magneto. The engine can be started direct from the magneto as easily as it could be on batteries, and a two-cycle engine can be reversed on the magneto the same as with the battery. In addition to the ignition, the magneto will operate a 15 candlepower electric bulb, which in a K-W searchlight gives a 1,500 candlepower ray that will locate obstructions a quarter of a mile away.

An Interesting Generator Set.

The Termaat-Monahan Company, of Oshkosh, Wis., manufacturers of the well known T. & M. 2-cycle motors, have lately produced a generator set which has the very acceptable feature of being noiseless in operation. The outfit is a 3 h.p. motor with a 4 in. x 4 in. cylinder, and a 1½ k.w. 110 volt generator. The regulation is within 2 per cent. from quarter load to full load. The increase of their business has led the company to put up a large and modern 60 x 100 ft. testing room and to start work on a foundry which will be, when completed, one of the largest in connection with any marine engine factory.



Fairbanks-Morse 15-H.P. Type "K."



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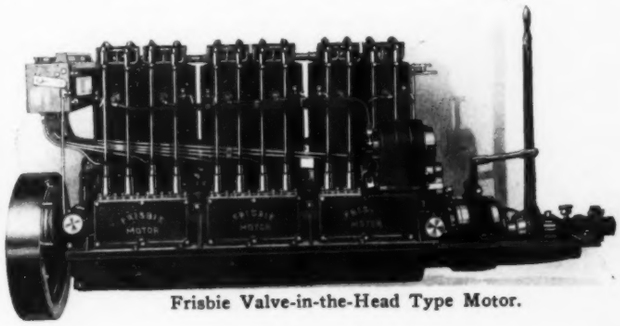


Frisbie Valve-in-the-Head Type Motor.

Gray Agent Moves.

A. E. Bennet & Son, of Buffalo, N. Y., have announced their removal from their old stand at 417 Auburn Avenue, to larger and more convenient quarters at 1784-86 Niagara Street, where they will keep a full line of Gray motors and supplies and all other accessories for fitting out a boat.

The Ferro in Scotland.

The Ferro Machine & Foundry Company, of Cleveland, Ohio, figured among the exhibitors in the recent Scottish Exhibition held in Glasgow. The buildings were in Kellingrove Park, in the west end of the city, and one of them called Kelvin Hall, after Lord Kelvin, the inventor of the deep-sea sounding apparatus, had a portion of its space devoted to an extensive exhibit of motor boats, marine engines, etc. Among these, the exhibit of Messrs. W. & S. Pollock & Company, the representatives of the Ferro Company, attracted much attention and was favorably commented on by the daily papers, showing the increasing popularity of American products abroad.

The Light Keeper.

We have before us the current issue (December) of the *Lightkeeper*, published by the Light House Literature Mission, of Belfast, Ireland. In addition to the publishing of this magazine, the mission supplies literature of all kinds to light-house keepers in practically every English-speaking country in the world. This number contains several very interesting articles, among them one devoted to an account of the life-savers of the United States. There is also a noteworthy article which can be best described by its title, "The Romance and Reality of the Light-House, being a story of Mr. George L. Lyon, keeper of Egg Rock Light Station, Mass.," by C. A. Lawrence, of Lynn, Mass. The whole magazine is filled with attractive and interesting illustrations, and both these and the subject matter would appeal to many people outside of the light-house service. We note with regret that the publishers announce the discontinuance of the magazine, at least for the time being, because of lack of funds. We trust that this will be merely a temporary condition and that we may soon again have the pleasure of looking through this interesting publication.

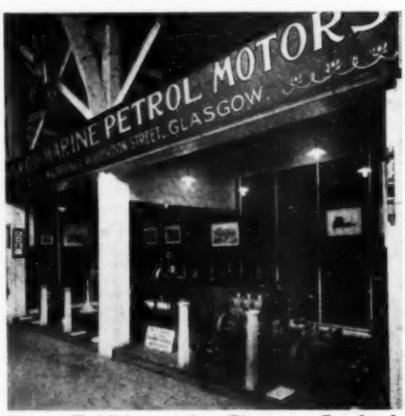
An Interesting Magneto Construction.

The Motsinger magneto, manufactured by the Motsinger Device Manufacturing Company, of Lafayette, Ind., presents a number of interesting and novel features in its construction. The field is constructed on the laminated principle, which eliminates an undesirable air gap, the magnets being shaped so that they form their own pole shoes. This leaves but one air gap, namely, that between the armature and the magnets, which tends to develop high efficiency in the magnetic field. Another advantage is gained by building up the magnetic field of a number of individual magnets, each independent of its neighbor, so that any loss of energy due to faulty material, will be reduced to a minimum. The Motsinger has 15 of these independent magnets as against an average of two, usually found in other makes of the same type. This magneto will generate current at such a low speed, that any engine which can be turned over on compression may be started direct on the magneto without the use of batteries. The 1912 model is equipped with removable bearings and can be furnished with a primary coil contained in the base.

K-W Ignition Co.'s Spacious New Home at Cleveland, O.

"Simple and Self-Contained."

That is the phrase the Lackawanna Manufacturing Company, New York City, use to describe their latest types of Reversible Valveless Motors, and years of effort to reduce the number of working parts to a minimum have made the statement true. All internal working parts are easily accessible, as the exterior parts are supported on the cylinder so that the whole interior can be instantly seen by simply removing the six bolts securing the cylinder to the base. A few of the special features of these engines are: cylinders of a special semi-steel mixture, cast in pairs and water-jacketed; an absolutely automatic oiling device without any complicated cups, mechanical pressure systems or sight feeds, waterproof spark-plug hoods, made of one piece of solid metal, an automatic reverse, which acts instantaneously by simply moving the lever to extreme forward and aft positions on its quadrant, and an anti-cranking device, which is a real innovation in marine engine building.



Ferro Exhibit at the Glasgow, Scotland, Show.

Dixie, Jr., 20-foot Hydroplane.

A class of stock 20 ft. hydroplanes, 4 ft. 6 in. wide, is being built by the Staten Island Ship Building Company from designs of Tams, Lemoine & Crane, of 52 Pine St., New York City, to be driven by a Sterling engine, and single-screw at a guaranteed speed of 35 miles per hour. The cost of these boats is to be $4,500 complete. While this may seem an excessive speed for a 20-footer the development of the hydroplane and the special knowledge obtained by the designers in the construction of the Dixie IV, makes the proposition very attractive, especially as 35 miles an hour is a flat guarantee and the sale is not concluded if the boat does not make it. We are sure the "Dixie Juniors" will give a good account of themselves in next season's races.

New Nest for the Oriole.

The Page Engineering Company, of Baltimore, Md., manufacturers of the Oriole gasoline engines, have just completed a modern reinforced concrete factory building located on the B. & O. R. R., fronting on the water front of Baltimore Harbor, and a marine basin capable of berthing a hundred boats with a wharf 800 ft. long. In connection with the basin, they anticipate having a marine railway and boat building plant located next to their present building in a short time.

New York Agent Appointed.

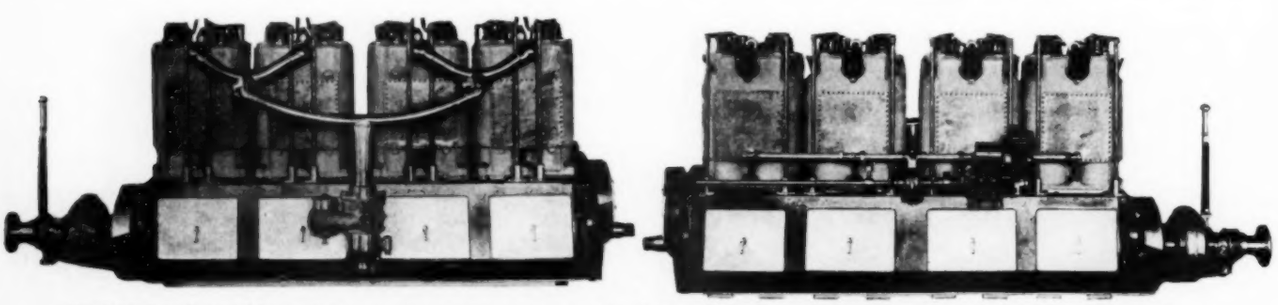
The Dayton Electrical Manufacturing Company have announced the appointment of Mr. R. V. Sutliffe to take charge of their New York office at 136 Liberty Street. The company, from its New York office, can furnish and install lighting plants for boats of any size from 30 to 160-footers, for customers in New York, New Jersey, Long Island and Connecticut, and will also carry in stock a complete line of electric lighting accessories, fixtures and supplies.

A New Racing Engine.

The Sterling Engine Company, of Buffalo, N. Y., have brought a new racing engine built for speed boats, but adaptable also to fast cruisers, of a three point suspension and modified barrel type. The engine has eight cylinders, 5½ in. bore, 6¾ in. stroke developing 130 to 140 h.p. with the entire base built of manganese bronze. The suspension is similar to that of an automobile engine, permitting the foundation to twist and turn without affecting the motor or curtailing its full engine power. The after end is fastened firmly and the forward held by bolts, but not rigidly. The cylinders are cast in pairs, valve-in-the-head type, with large water spaces for cooling both cylinders and valves. Inlet valves are of the cage type and the exhaust valves seat on water cooled heads. Each side has large hand hole plates. Journal caps are directly supported between the cylinders. The two end main bearings are of a radial ball type. The manganese bronze reverse gear is supported by a continuation of the engine base, and composed of a positive locking clutch and reverse. The driven shaft is journaled with Timken roller bearings and takes care of the radial load and the reverse thrust, the forward thrust being taken care of by a radial type thrust ball bearing. Pockets are provided for the connecting rods to dip in oil, the oil passing through the pits by means of troughs. A space is provided between each pit, through which water is forced to cool the oil. The Brush patent lubricating system is used. The engine has a Bosch magneto, two point system. The entire engine weighs 1,100 lbs. with full racing equipment.

A Correction.

We were sorry to find that a geographical error was allowed to creep into our December issue. The Marine Compass Company have called our attention to the fact that their home address is Bryantville, *Mass.*, and not Bryantville, Conn., as was made to appear. The difference in territory involved is not tremendous, but we like to be exact in all cases.



Starboard and port views of the new 8-cylinder racing engine built by the Sterling Engine Company. See description above.

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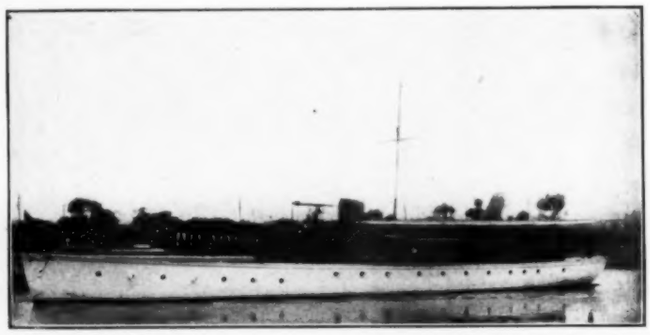
We have a complete list of all steam and power yachts, auxiliaries and houseboats available FOR SALE and CHARTER.
A few are shown on this page. Plans, photographs and full particulars mailed on request.

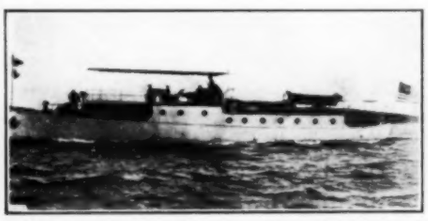


No. 885.—118 ft. fast, twin screw steel power yacht; speed 16 to 18 miles; three double staterooms, two saloons, two baths, etc.; exceptionally handsome craft; best of type available.

Please mention MOTOR BOATING.

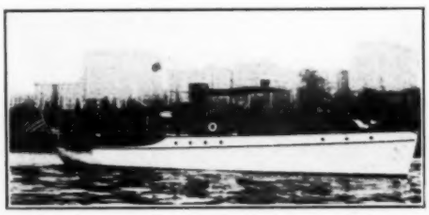
No. 994.—For Sale—Splendid 83 ft. cruising power yacht; built 1910; speed 13-15 miles; 100 H. P. Standard; price attractive.

Please mention MOTOR BOATING.



No. 175.—For Sale or Charter—Now in Florida; 85 ft. cruising power yacht; speed 12-14 miles. Available at unusually low figure, owner having built larger from our design.

Please mention MOTOR BOATING.

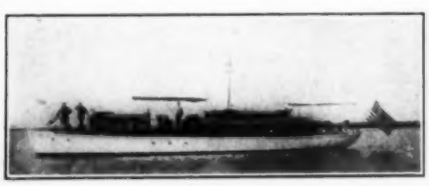


No. 1532.—For Sale—Twin screw; 75 x 13.6 ft. cruising power yacht; launched last spring; speed 12-14 miles; very able, handsomely finished craft; best of size available.

Please mention MOTOR BOATING.

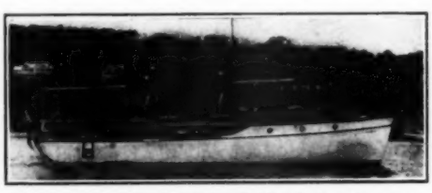
No. 1464.—New 55 x 13 ft. raised deck cruiser; speed 11 miles; 40 H. P. double and single stateroom; 13 ft. saloon, etc.; heavy construction; price low.

Please mention MOTOR BOATING.



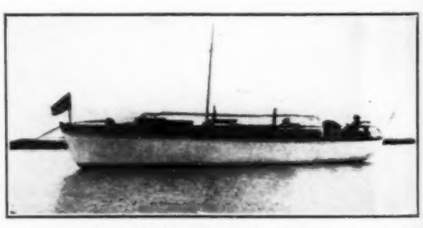
No. 429.—For Sale—Handsome 68 x 12.3 ft. motor yacht; speed 12-13 miles; Standard motor; mahogany finish throughout. Excellent bargain.

Please mention MOTOR BOATING.



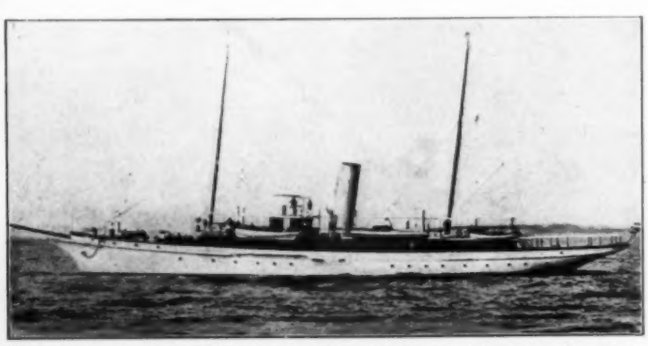
No. 1026.—Unusual Bargain—Bridge deck cruiser, 53 x 10.3 x 3.4 ft.; built 1910; speed 10-11 miles; 20th Century motor; double stateroom, saloon, etc. Bargain.

Please mention MOTOR BOATING.



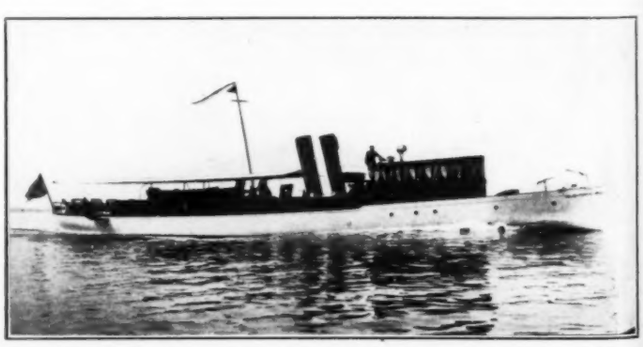
No. 651.—Light draft raised deck cruiser; 50 x 10.3 x 2.6 ft.; Lawley build; speed 10 miles. Unusual bargain.

Please mention MOTOR BOATING.



No. 238.—200 ft. steam yacht; ten staterooms; continuous deck house; good sea boat.

Please mention MOTOR BOATING.



No. 352.—Exceptional bargain—110 ft. fast steam yacht; speed up to 20 knots. Complete and in excellent condition.

Please mention MOTOR BOATING.

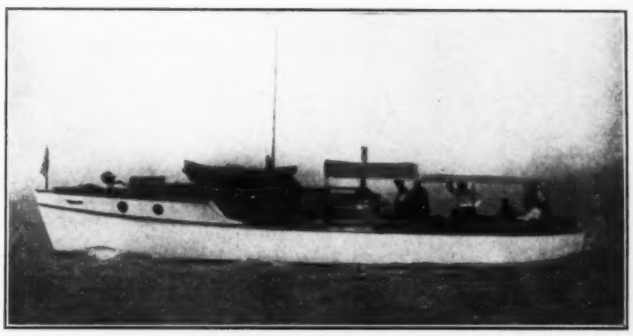
STANLEY M. SEAMAN
YACHT BROKER

220 BROADWAY ESTABLISHED 1900 **NEW YORK CITY**

Telephones: 3171 3479 CORTLANDT CABLE, "HUNTSEA" N. Y.

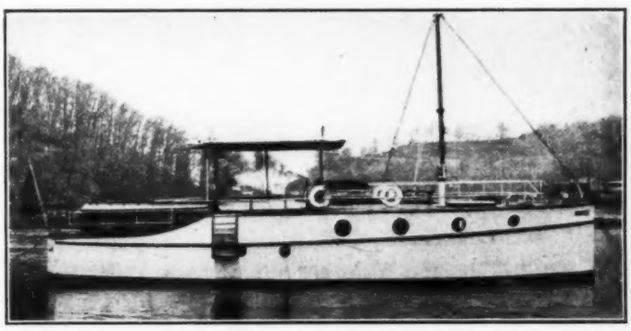
Special offering of Modern Single Hander Gasoline Cruisers

No. 6800.—46 ft.; launched 1911; 30 Ralaco.

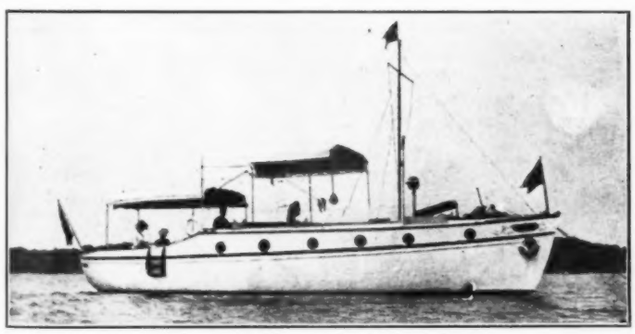


No. 6799.—43 ft.; 18 Standard. Bargain.

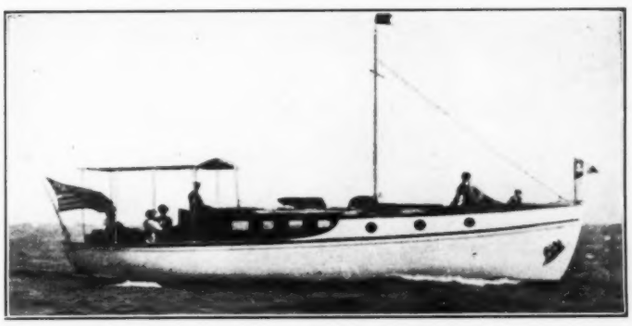
No. 6740.—40 feet; launched 1911; 24-30 20th Century.



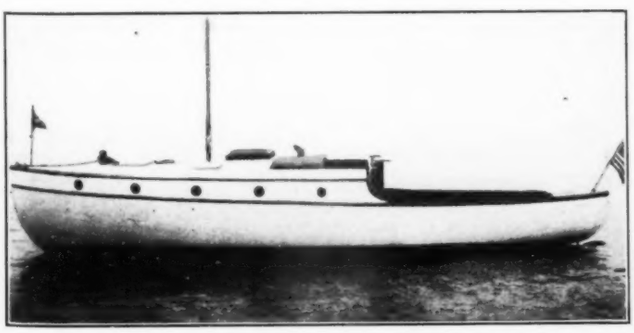
No. 6613.—40 feet; launched 1911; berths 6; 2 toilets; 48-72 H. P. Scripps. Cost $6,000; sacrificed.



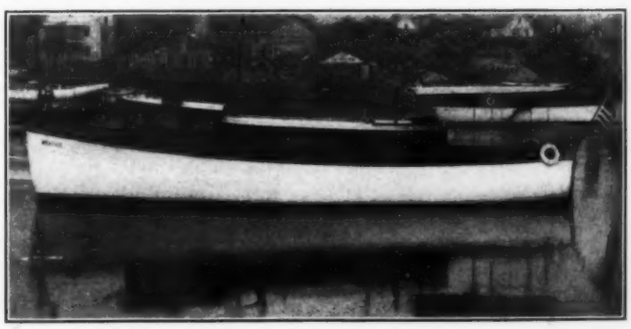
No. 6784.—40 ft.; twin screw.



No. 6727.—41 feet; new 1910; 24 Lamb.



No. 6636.—34 feet; 25 Jager; $1,500.



6387.—40-foot De-Luxe, launched 1910; 28 H. P. Campbell.

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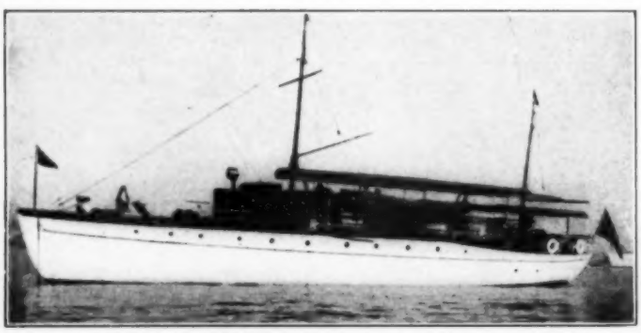
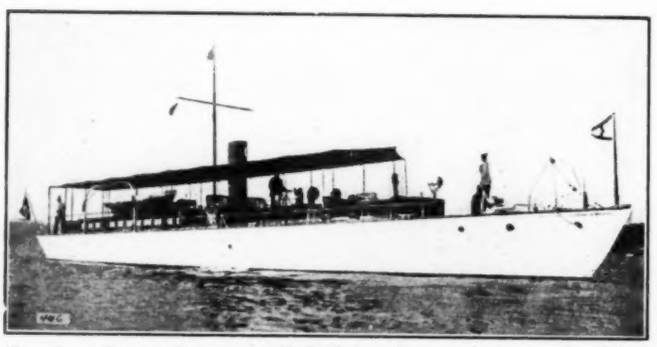
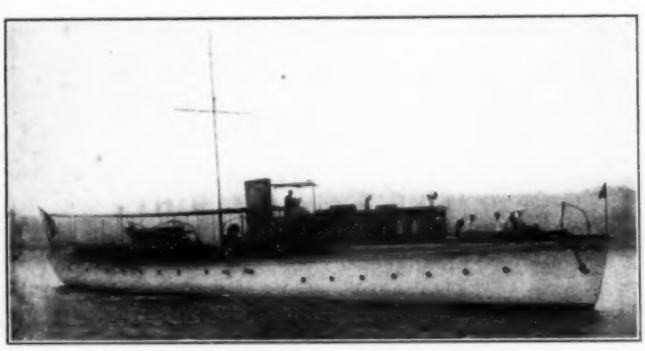


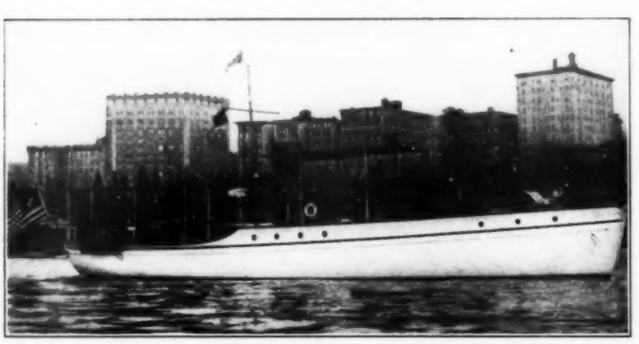
No. 1766.—New raised deck cruiser, 75 x 14; two 60 H. P. Craigs.
Please mention MOTOR BOATING.



No. 948.—91 ft. power boat; two 125 H. P. Craig engines; speed 18 to 20 miles. Price exceptionally low.
Please mention MOTOR BOATING.



No. 1553.—Fast, 118 ft., steel, twin-screw power yacht; exceptional accommodation; speed 16 to 18 miles.
Please mention MOTOR BOATING.



No. 1770.—Latest design; twin-screw; 75 ft. cruiser; ideal arrangement; excellent motors.
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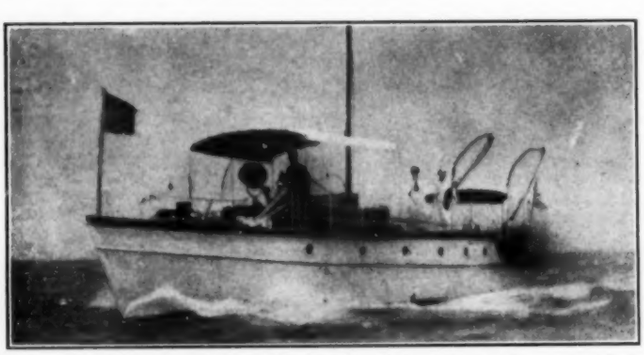
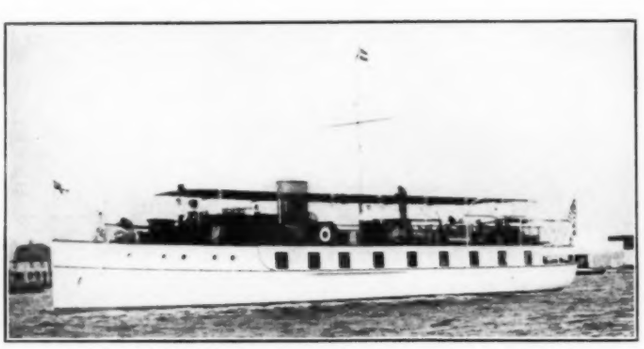
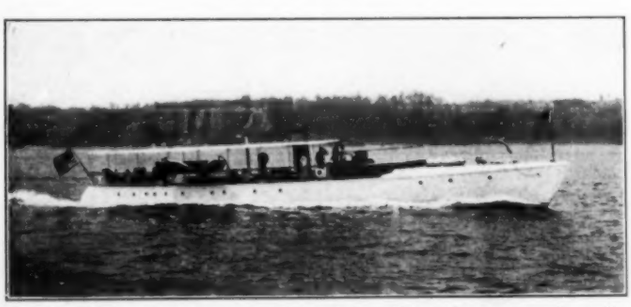


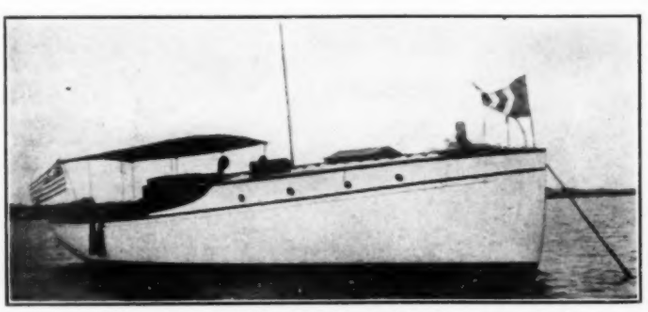
No. 1401.—Raised deck, 58 ft. x 12 ft., staunchly built, launched 1909; standard motor, 50 H. P.
Please mention MOTOR BOATING.



No. 1745.—Combination houseboat and cruiser, 90 ft., two 60 Craigs.
Please mention MOTOR BOATING.



No. 1243.—Fast 90 ft. steel gasolene yacht; two large Standard motors; speed 25 miles.
Please mention MOTOR BOATING.



No. 1607.—Popular type, 40 ft. cruiser; Standard engine; best construction.
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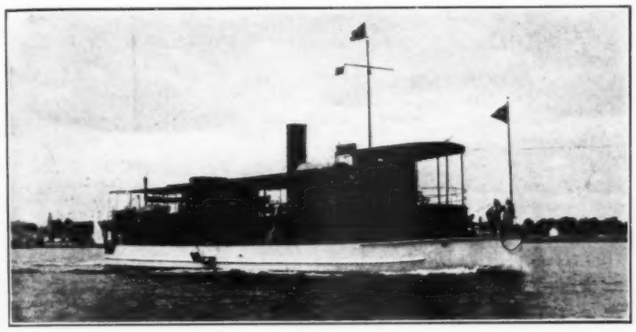
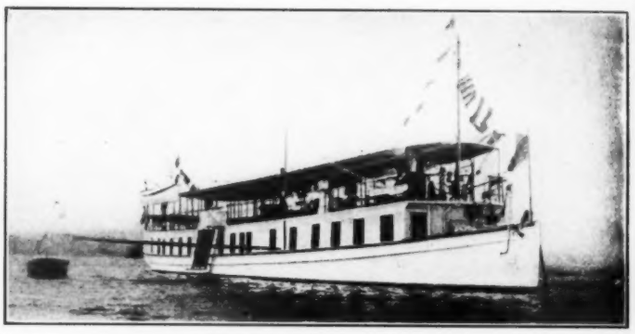
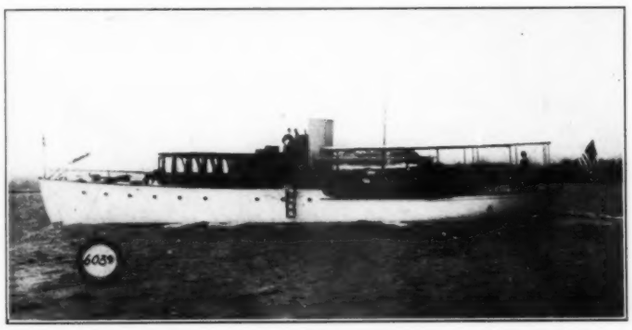


No. 1849.—For charter and for sale; steel twin screw steam houseboat; 115 ft. x 17 ft. x 3 ft. 6 in.
Please mention MOTOR BOATING.



No. 1808.—For charter and for sale; 123 ft. x 17 ft. 8 in. x 3 ft. 4 in.; twin screw motor houseboat, Standard motors.
Please mention MOTOR BOATING.



No. 7871.—For Sale—Attractive 83 ft. twin screw power yacht; Standard motors. Two double staterooms, bath; all conveniences; very desirable.
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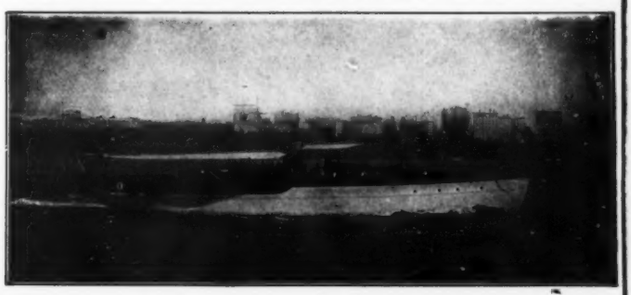

No. 7905.—For sale or charter, Lawley built 83 ft. motor yacht; excellent condition.
Please mention MOTOR BOATING.

No. 7334.—For sale or charter, twin screw cruiser; 12 miles.
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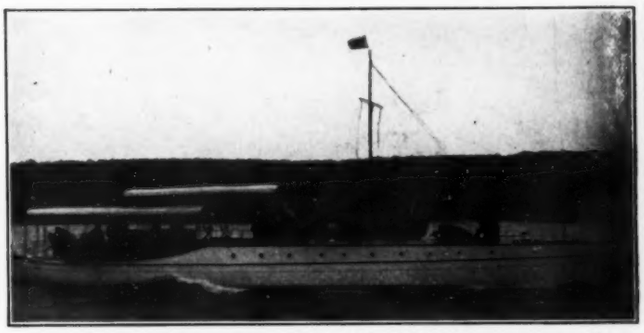
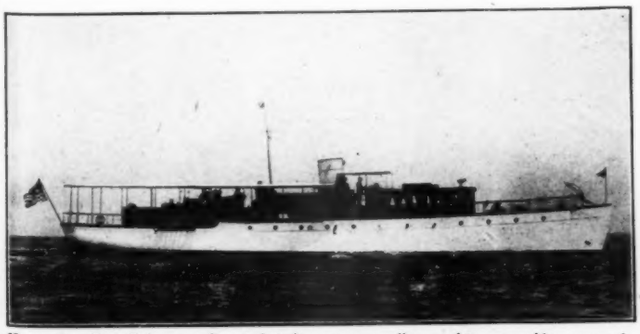
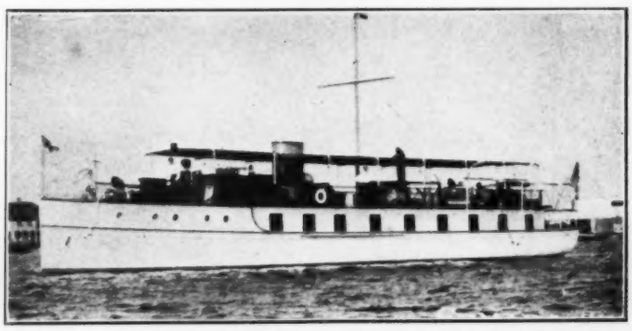


No. 7674.—For charter or for sale, 75 ft. shallow draft, twin screw motor yacht.
Please mention MOTOR BOATING.



No. 7029.—For Sale—110 ft. steel twin screw gasoline yacht, very able; unusual accommodations.
Please mention MOTOR BOATING.



No. 1865.—For charter, delivered in Florida, twin screw houseboat, practically new.
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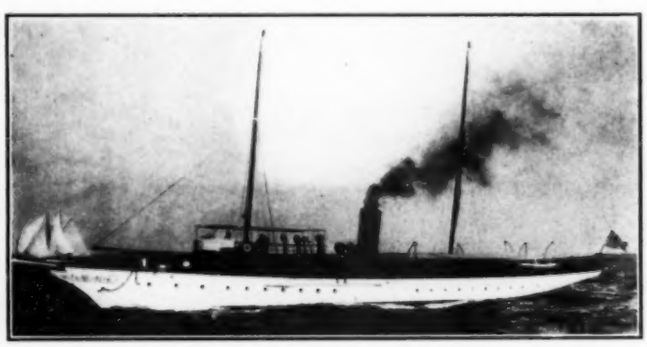
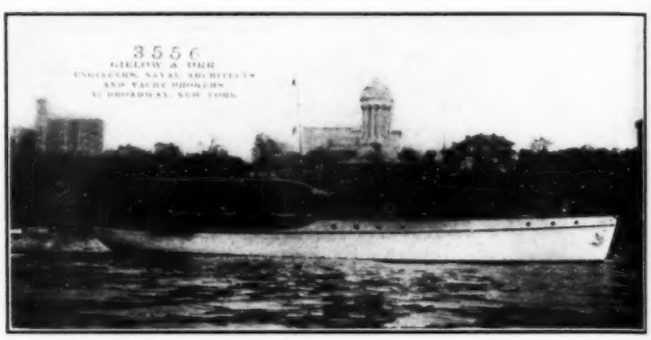
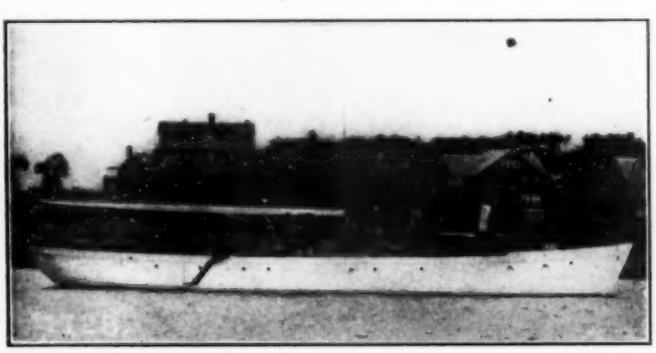


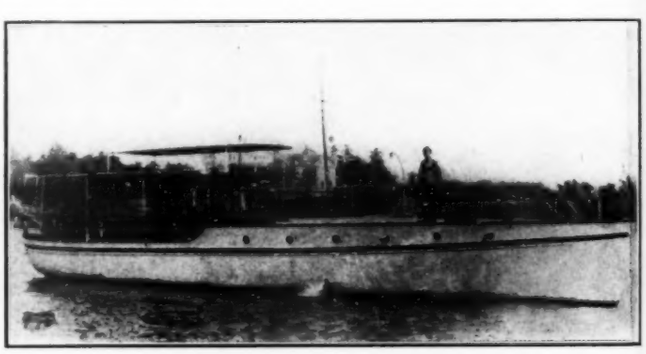
No. 3223.—170 ft. steel steam yacht; large accommodations; good speed; owned by an estate.



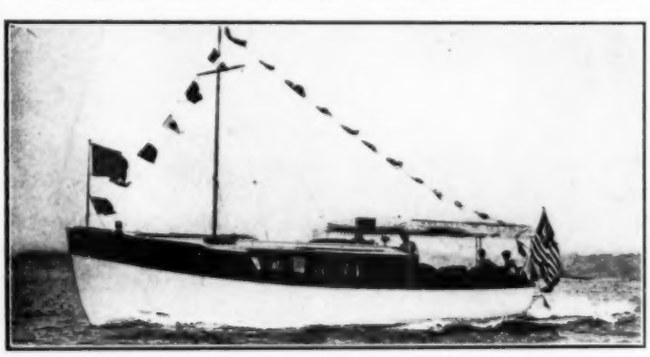
No. 3556.—Practically new, 75 ft. twin-screw motor yacht. Able and seaworthy.



No. 1728.—96 ft., twin-screw, Lawley-build motor yacht. Price reasonable.

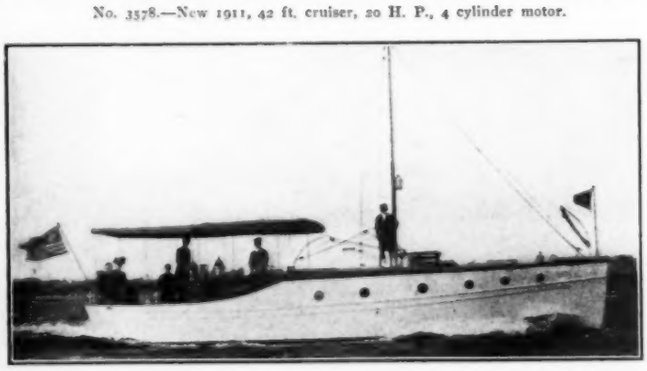


No. 3095.—Attractive 60-ft. Gielow-design motor yacht. Two staterooms. 40 H. P. motor.

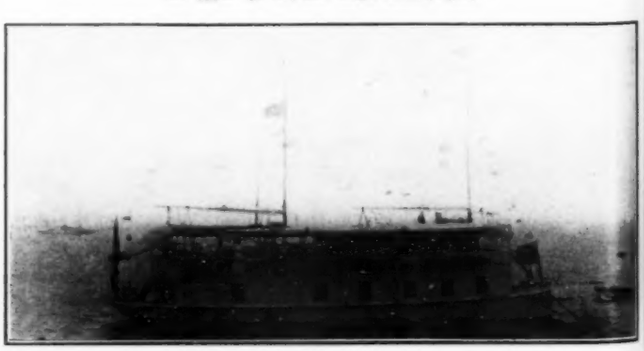


No. 3578.—New 1911, 42 ft. cruiser, 20 H. P., 4 cylinder motor.

No. 3550.—30 ft.; new Eagle motor, 1911.



No. 3594.—1911 raised deck cruiser. Stateroom, electric lights, etc.; 24 H. P. motor.



No. 498.—Real bargain, 65 ft. power houseboat. Good inventory.

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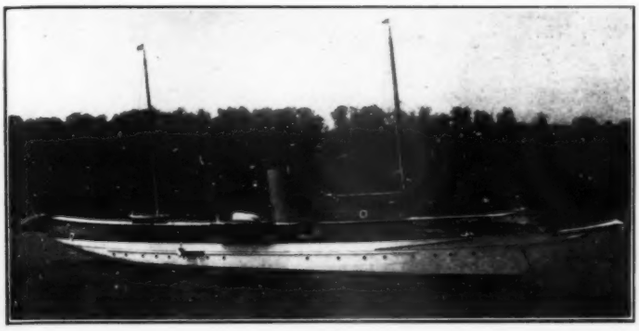
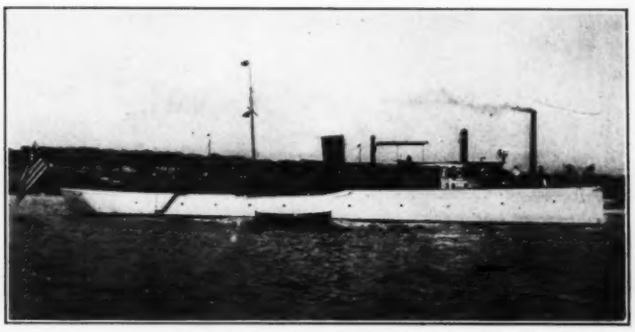
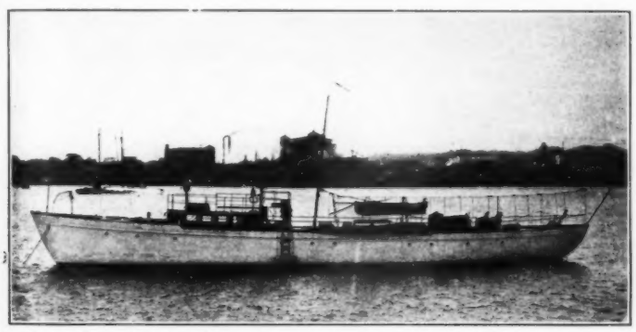


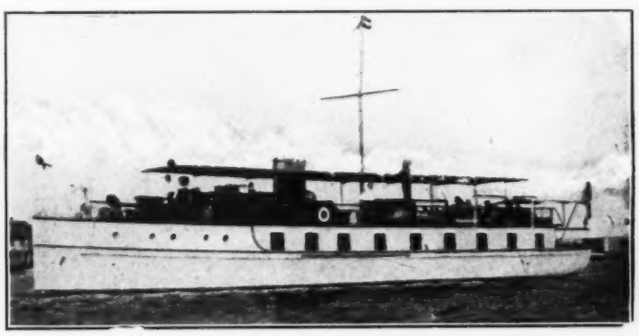
No. 6804.—Sale or charter—160 ft. steel steam coast cruiser; 5 staterooms; 2 saloons, 2 baths; in perfect condition; consider gasoline cruiser 75 to 100 ft. part payment.



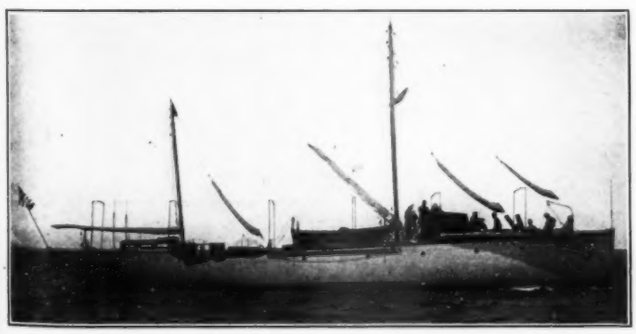
No. 6737.—113 ft.; two 150 Craigs.



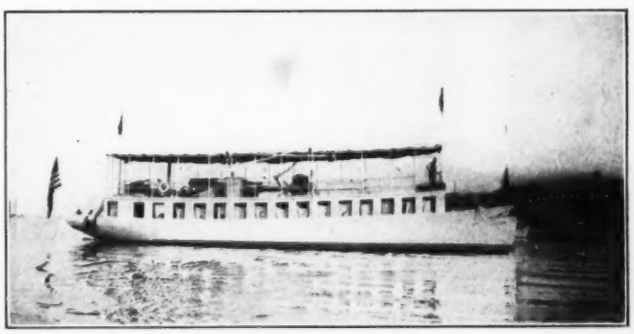
No. 6582.—96 ft.; two 50 Standards.



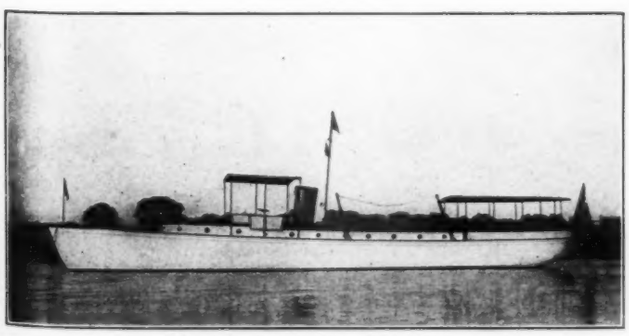
No. 6779.—90 ft.; two 60 Craigs.



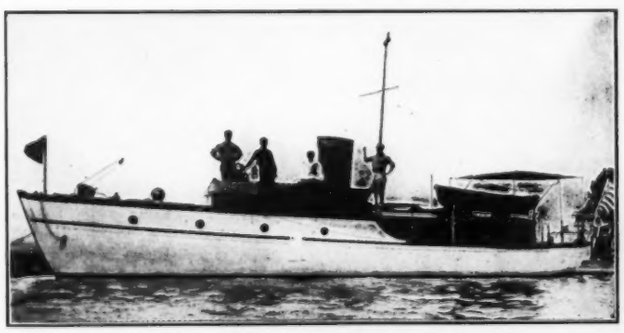
No. 6544.—75 ft.; twin screw; two 65 Jagers; low price.



No. 6699.—70 ft. Southern cruiser; 60 Craig.



No. 6684.—60 ft.; two 30 Harvards.



No. 6722.—52 ft.; new 1911; 25 Standard.

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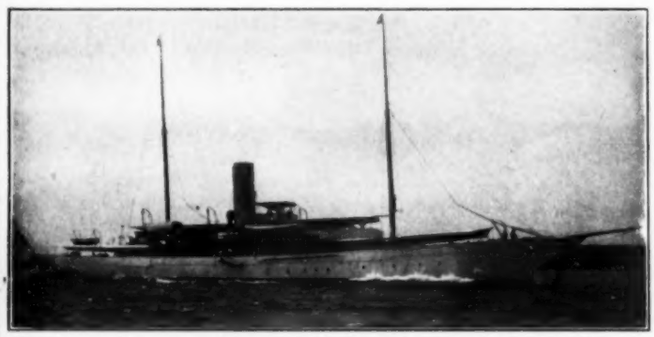

No. 3852.—200 ft. ocean going steam yacht; best design and build; one of the finest of the large vessels.
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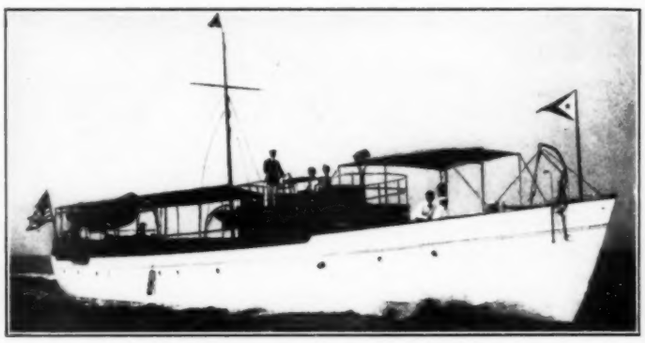
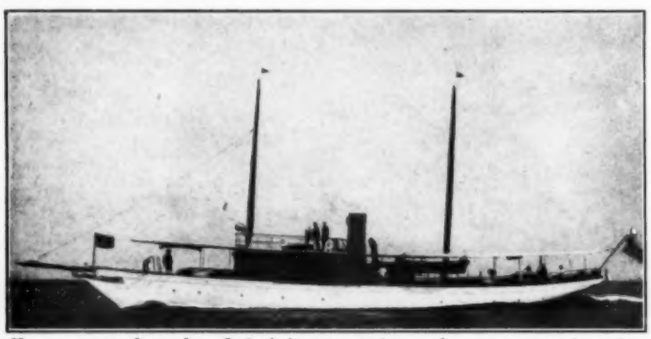


No. 3191.—95 ft. flush deck gasoline cruiser; teak finish; twin screws.
Please mention MOTOR BOATING.



No. 4171.—120 ft. modern flush deck steam yacht; good as new; attractive price.
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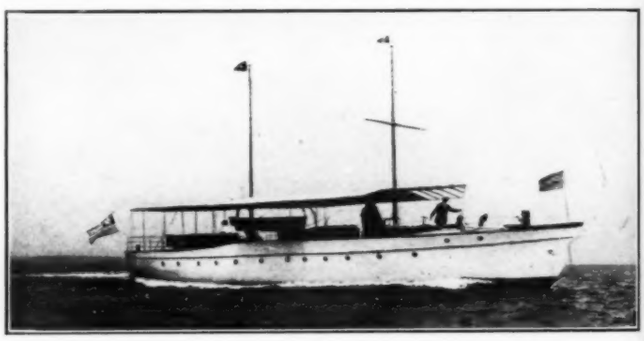
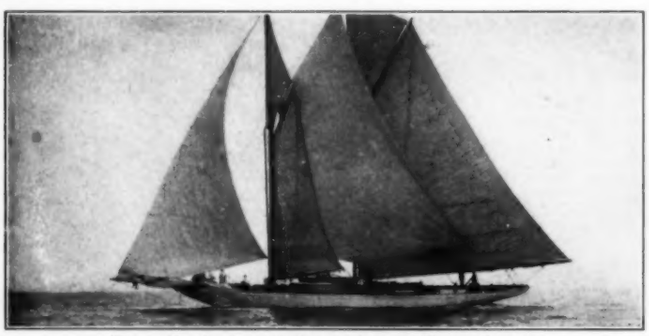


No. 4834.—75 ft. gasoline cruiser. Six cylinder Standard motor.
Please mention MOTOR BOATING.



No. 2966.—63 ft. waterline modern auxiliary schooner.
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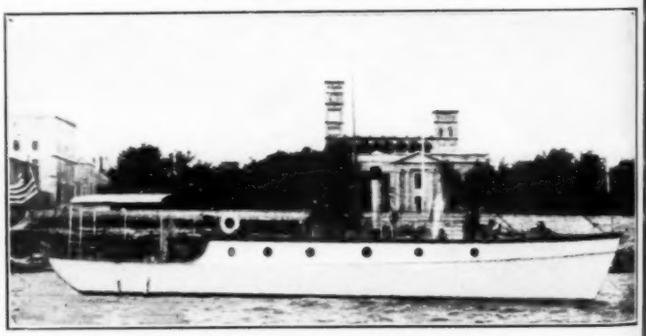

No. 4600.—58 ft. raised deck cruiser, now in Florida. For sale only.
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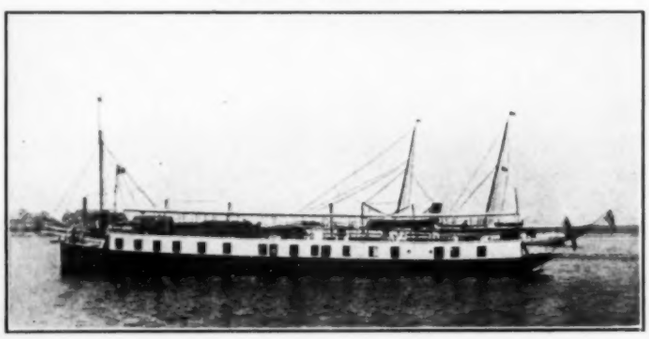
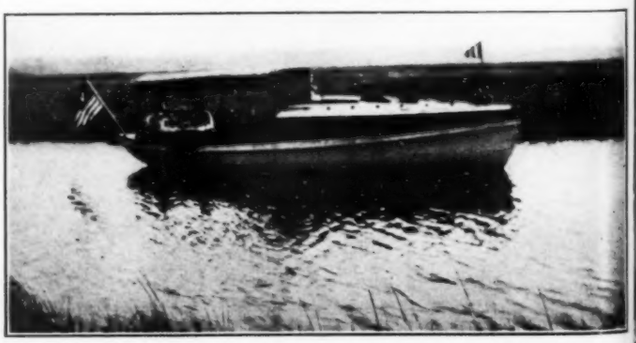


No. 2514.—125 ft. power houseboat, now in Florida. For charter or sale.
Please mention MOTOR BOATING.



No. 3929.—36 ft. raised deck cruiser, 20 H.P. motor. Good sea boat.
Please mention MOTOR BOATING.

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Highest Grade Yachts of All Types For Sale or Charter —
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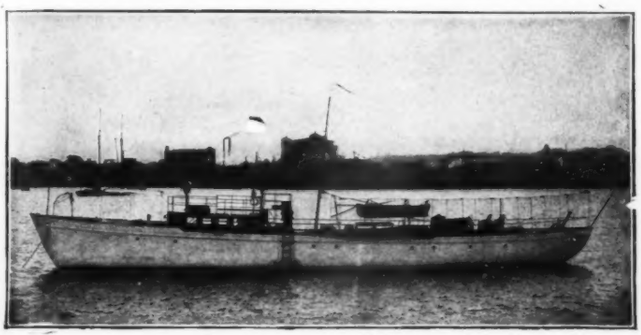
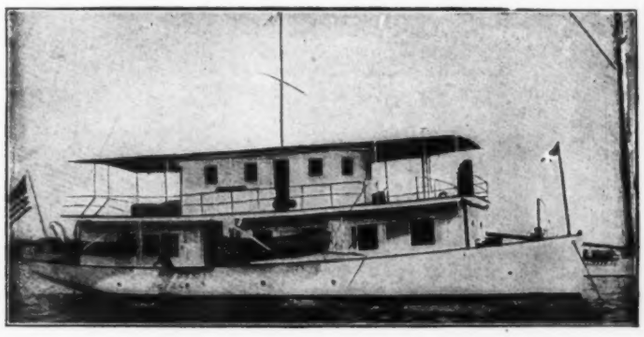
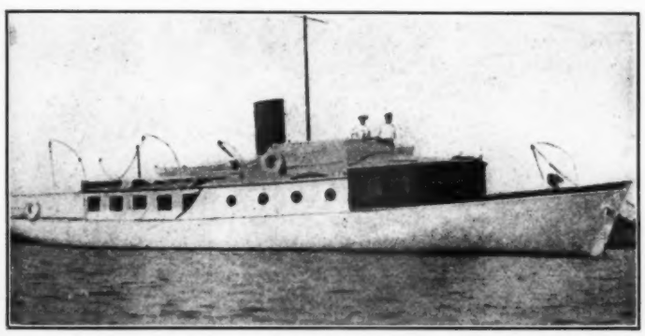


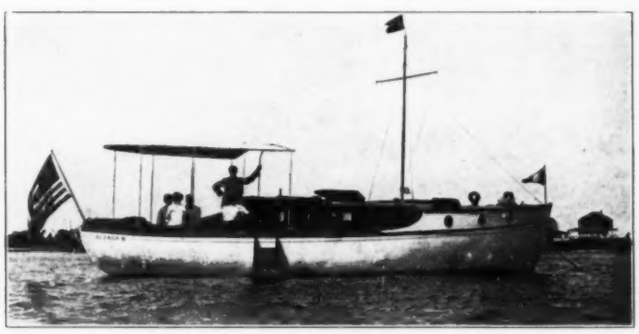
No. 6062.—96 x 14 x 4.3; two 60 H. P. Standard motors; excellent condition.
Please mention MOTOR BOATING.



Houseboat; 68 x 62 x 33 x 4; two 25 H. P. Standard motors.
Please mention MOTOR BOATING.

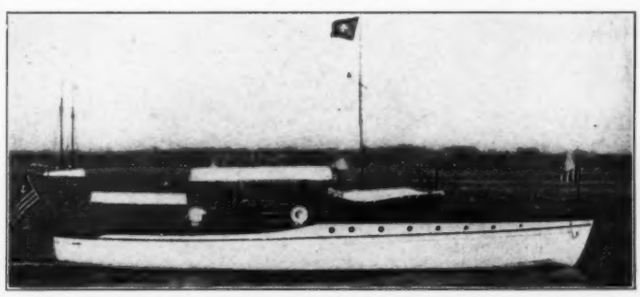


No. 261.—60 ft. x 13 ft. 2 in. x 3 ft.; 60 H. P. Lamb motor; speed 13 miles. Attractive price.
Please mention MOTOR BOATING.

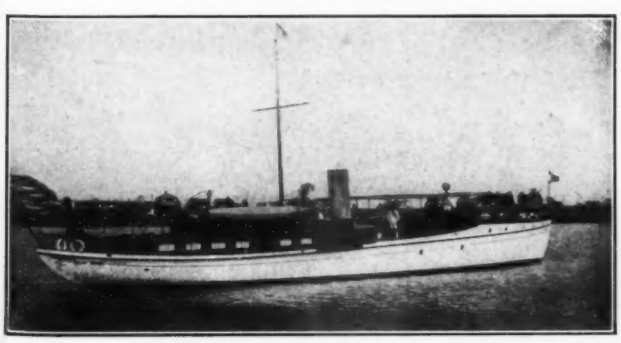


No. 742.—41 x 36.6 x 10 x 3; 24 H. P. Lamb motor.
Please mention MOTOR BOATING.

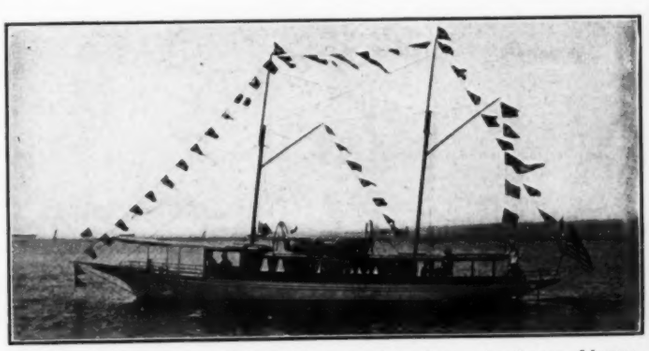
No. 907.—33 ft. x 9 ft. 2 in. x 3 ft.; 12 H. P. Globe; speed 9 miles; cockpit 10 ft. Price very low.
Please mention MOTOR BOATING.



No. 6245.— 54 x 50 x 10.6 x 3.6; 25 H. P. Standard motor; perfect condition.
Please mention MOTOR BOATING.



No. 7735.—100 x 17 ft. power yacht; 150 H. P. Craig; price low.
Please mention MOTOR BOATING.



No. 8054.—67 x 10.6 x 3; 40 H. P. Standard; now has rail around entire top of house; good passenger boat; accommodates 40 outside; 30 inside.
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Construction Without an Equal **Speed Greatest Obtainable**

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Offer several of our own magnificent product taken in trade from parties for whom we built more elaborate outfits. Also owners' boats on storage; Cabin cruisers, Day cruisers, Runabouts. Write us. We can supply your wants.

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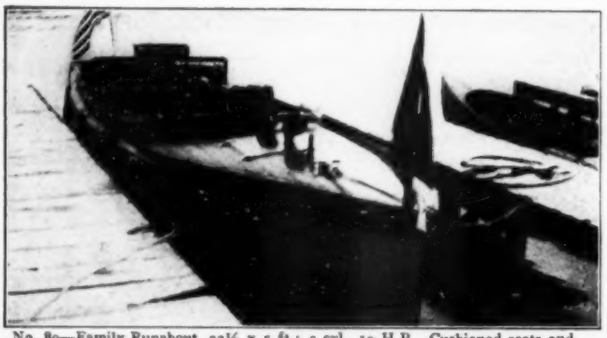


No. 80—Family Runabout, 22½ x 5 ft.; 2 cyl., 10 H.P. Cushioned seats and lazy backs; signal horn; flagpoles; boat cover. New last season. Fine condition. Cheap.

No. 78—New Mahogany Day Cruiser, 40 x 7 ft. 6 ins.; 6 cylinder, 90 H.P. Van Blerck Motor; magnificent equipment; toilet, lavatory, transom couches. Grand Bargain.

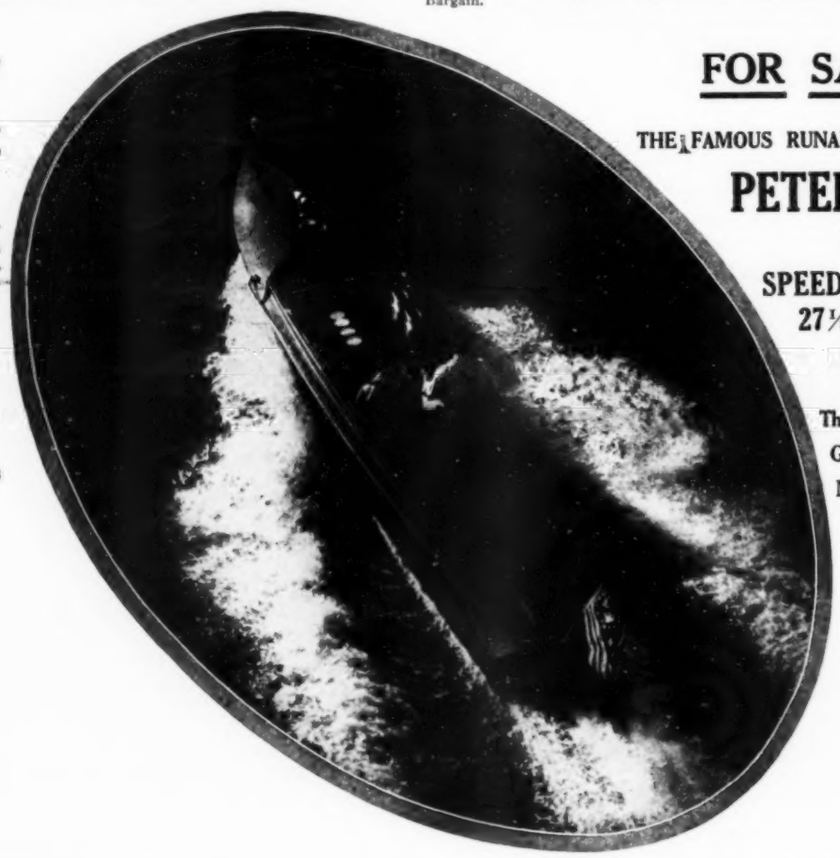
PETER PAN IV

Won ten trophies, including Championship Hudson River.

Ran NewYork to Poughkeepsie and Return without stop, never missing an explosion.

HANDSOMEST MAHOGANY RUNABOUT AFLOAT.

Upholstered Lazy Backs Cushioned Seats and Armchairs.



FOR SALE

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PETER PAN IV

40 H. P.

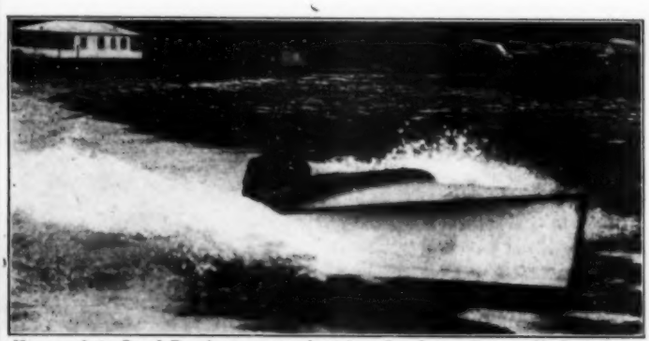
SPEED, 27½ miles per hour.

BETTER THAN BRAND NEW

Thoroughly Refinished

Guaranteed Perfect

Magnificently Appointed



No. 77—Auto Speed Runabout, 21 x 4 ft. 6 ins. Speed 22 miles; 30 H. P. Reliance motor; very high class; carrier six. All appointments.

No. 72—Brand new 21 ft. x 4 ft. 6 ins. speed runabout. Mahogany decks, motor hatches, coamings and transom, mahogany lazy backs, carrier six. 25 H. P. Continental motor. Bosch magneto, rear starter; speed 21 miles. This is a Reliance special.

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Through our brokerage department we offer a complete list of the best available steam and motor yachts on the market. Complete descriptions, plans and photographs promptly submitted.

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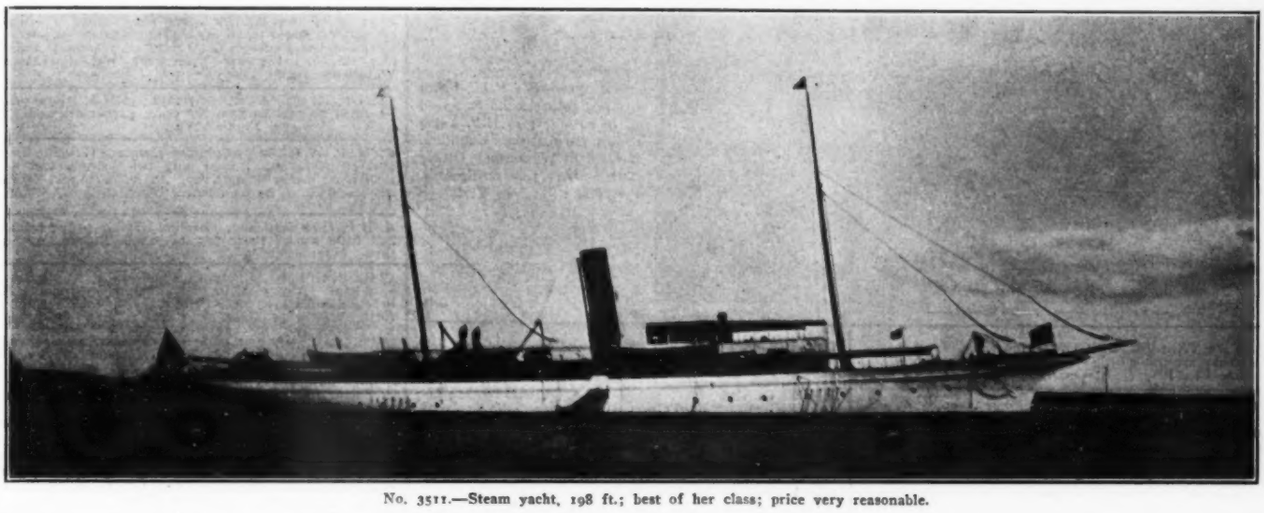
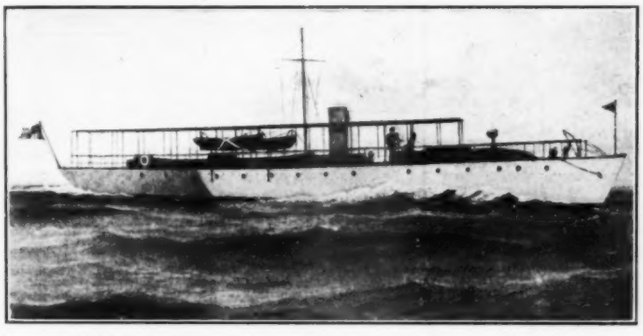
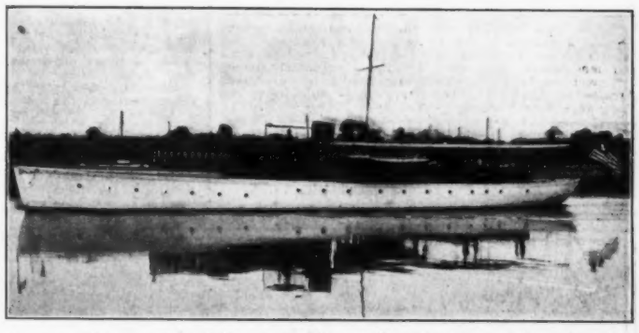


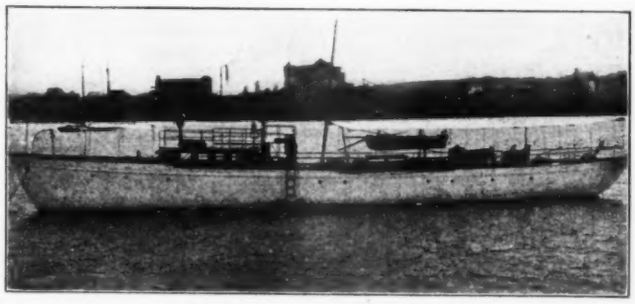
No. 3511.—Steam yacht, 198 ft.; best of her class; price very reasonable.



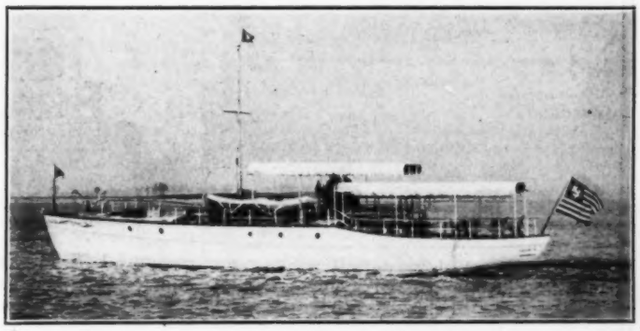
No. 2776.—High speed motor yacht, 91 ft.; twin screw; Craig motors; bargain to quick buyer.



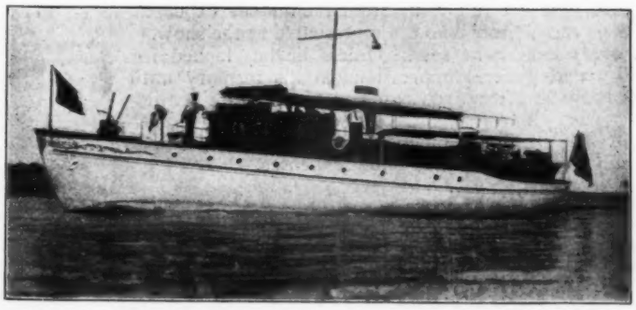
No. 3032.—Motor yacht, 118 ft. x 15 ft. 6 in. x 5 ft.; twin screw; Craig engines, 600 H. P.; electric light; very handsomely appointed yacht; built 1910.



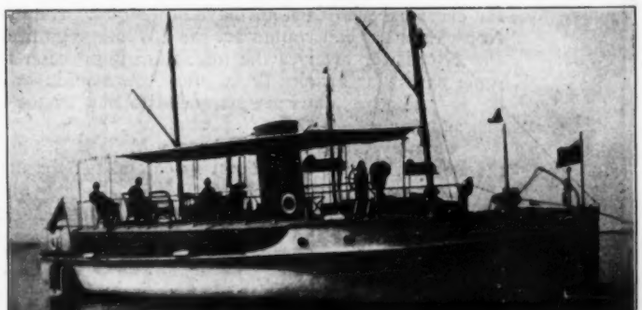
No. 2751.—Motor yacht, 96 ft. x 14 ft.; excellent condition; twin screw; Standard motors; 3 double staterooms; splendid condition. Price low.



No. 2582.—Motor yacht, 60 x 13, with 25-32 H. P. Standard equipped. **Bargain.**



No. 2804.—Motor yacht, 75 ft. x 15 ft.; twin screw; Standard motors; electric light; 2 staterooms, bath, saloon and pilot-house; very roomy. Sell very low, as we are building larger yacht for owner.



No. 2655.—Now in Florida—Roomy, light-draft, Southern cruiser, 57 ft. x 13 ft. x 30 in.; 45 H. P. motor; 2 staterooms, bath, toilet, electric light, 18 ft. launch; fully equipped. Price very reasonable.

Please mention MOTOR BOATING.

THE MOTOR BOATING MARKET PLACE

The rate for "For Sale" and "Want" advertisements is 3 cents per word. If an illustration is used the charge is as follows, which includes the making of the cut:
Cut one inch deep, one column wide..... $2
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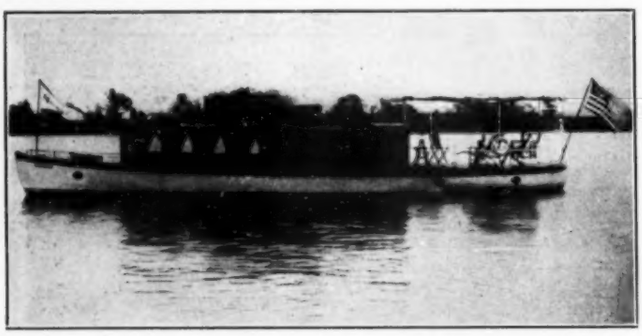
Opportunities for the Motor Boatman

Before you buy or before you sell examine the exceptional buying and selling opportunities under this heading. They comprise the best offers of the month. Please mention Motor Boating.



No. 1510.—For Sale: Cabin Cruiser, 50 x 9 x 2.6 ft. Speed 11 to 12 miles; 40 H.P. Lamb motor. In first-class condition. Located in Wisconsin. Owner cannot use. Cox & Stevens, 15 William St., New York.

USE "SNAPPER" ENGINES for your small boats. They are a big little engine, built by The Automatic Machine Co., Bridgeport, Conn.

FOR SALE at reasonable price, one 300 H. P. six cylinder single acting reversible Standard engine. Has been in use one year and better than new. Reason for sale, am manufacturer of marine motors and am changing Standard for my own make. Also have one Standard lighting outfit in A1 shape. Will sell both together or separately as purchaser may require.
W. E. SCRIPPS,
SCRIPPS MOTOR CO.,
631 Lincoln Ave., Detroit, Mich.

KNOW THE TRUTH about the boat you intend to buy. At a reasonable fee we inspect and submit written reports on the condition of all types and sizes of hulls and machinery. Our work for the government should commend us to you. Whittelsey & Whittelsey, Naval Architects, Engineers, Inspectors and Appraisers, 11 Broadway, New York City. Tel. 4718 Rector.

NEW 54 H. P., six-cylinder Elbridge engine, just from factory. Aluminum manifolds, base and cylinder heads, extra finish throughout. Built for Mr. Coleman du Pont of Wilmington, Del.; exchanged for a larger power. Price $700. Emerson Engine Co., Alexandria, Va.

CANADIANS, Second-hand engine bargains. Send for list. Guarantee Motor Company, 73 Bay Street, North, Hamilton, Ont., Canada.

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Anything from 55 feet down, designed and built.

Before you place the contract for either designing or building your new boat this season, get into communication with us. We can save you money and give you a degree of personal satisfaction in your boat seldom attained by ordinary builders.

Our facilities are complete—our work unexcelled. We are competent to design any kind of a boat you want and make your boat suit your particular requirements exactly. Any make of engine installed. You will have only one profit to pay and one contract to oversee. This will save you both time and money.

We designed and built Patricia and many other well known boats.

Write us your requirements at once. Our brokerage department lists the best boats of all types on the market.

THE W. F. RUDDOCK BOAT AND YACHT WORKS,
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SCORED CYLINDERS REPAIRED, $8 per hole, by oxy-acetylene welding, including grinding to make them smooth and round as before scoring. Diameters 4 in. to 6 in.; smaller bores less. Send piston with cylinder. Better than re-boring because requires no special oversize pistons and rings. References and further facts on request. Waterbury Welding Company, Waterbury, Conn.

CRUISER WANTED—Around 35 feet, light draft; must be real bargain for cash; particulars and photo. Cruiser, Box 383, Norfolk, Va.

65 H. P. Wolverine 3-Cylinder Kerosene-Gasoline Engine and complete outfit, used only two seasons and better than new; owner going away. Price, $2250.00. Has also Producer Plant, $350.00 extra. A. Stainforth, Winthrop, Mass.

10c H.P. Otto Stationary Gasoline Engine in fine condition and little used. Price $850.00, f.o.b. Boston. A. Stainforth, Winthrop, Mass.

FOR SALE, 50 H.P. 1910 Matthewson, 6-Cylinder Engine. Also 50 H.P. Pierce Arrow, 1909 model. Both in excellent condition. Price $450.00 each. A. Stainforth, Winthrop, Mass.

FOR SALE—A pair of new 6 cylinder, 40-50 Standard marine gasolene engines, complete outfits as supplied by manufacturers, including deck controls. These engines have never been taken from crates of original shipment. Will be sold at considerable concession from builder's prices. Apply, Gas Engine & Power Co., and Charles L. Seabury & Co., Consolidated, Morris Heights, New York City.

YOUNG MAN, 25, with six years' experience designing and building high-grade motor boats, wishes position with reliable motor boat company. Can furnish references. Address, Box 35, care of Motor Boating.

FOR SALE—2 cylinder, 2 cycle, 6 H. P. De Mooy engine; reverse gear and complete boat equipment. Guy Eldredge, Fairhaven, Pa.

FOR SALE—Speed; hull, 27 x 4 feet, 2 inches; three skin, ¼ cypress oiled silk and mahogany, finished natural; has done 20 miles with 21 horse engine; price, $175. Write for particulars. C. H. Retcher, 23 North Park Row, Erie, Pa.

FAST RUNABOUT FOR SALE.—32 ft., white pine planking, Mahogany Decks, 60 H.P. 4-cycle motor, full equipment. Has been used only two months. In first class condition. Speed 26 miles per hour.
NIAGARA MOTOR BOAT CO.,
North Tonawanda, N. Y.

"Show Time is Sales Time"

MOTOR BOATING
THE NATIONAL MAGAZINE OF MOTOR BOATING

Boston Show Number :: February Issue

In addition to all its regular editorial features, the February issue of MoToR Boating will be devoted to the Boston Motor Boat and Engine Show, held January 27th to February 3d.

February MoToR Boating will cover this show completely. Every exhibit will be described and illustrated. This will serve as a guide to the exhibits for everyone who visits the show and will give all important details for those who are unable to be present.

February MoToR Boating will be indispensable for every manufacturer who exhibits at the show—and for everyone who does not have an exhibit. Exhibitors can thus get full value from their show expenses. Non-exhibitors can counteract the advantage gained by their competitors who are represented at the show.

No visitor receives the maximum impression from every exhibit he sees. Unless he has looked for some particular articles the whole show remains a confusion of general impressions in his memory until the individual exhibits are reminded to him by the advertising he afterwards reads in his favorite boating magazine.

Your advertisement in February MoToR Boating will supplement the buying impressions you create at the Boston Show. Use liberal space and get the maximum returns from your show expenses.

Send Your Reservation To-Day

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J. S. Hildreth, Adv. Mgr. **381 Fourth Ave, New York**

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Yacht Owners and Naval Architects
A Model often saves its cost in suggesting desired changes before building is commenced. A handsome ornament for home, office or club. Our models are unexcelled in quality of workmanship and perfection of detail. Prices moderate. *Investigate.*
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Plans, Specifications and Estimates furnished for all requirements
Descriptions and Photos submitted upon receipt of inquiry.

A Practical Boat.

(*Continued from page 45.*)

and inexpensive cabin, which the boat can carry well.

For extreme rough weather use, the cockpit cover buttons to the back of the operator's seat, and covers the after cockpit, making a boat that will stand a big amount of rough weather.

I can hear the reader say that this is not the boat for the average man, that the cost must be too high, but this boat can be built and completely equipped for from eight hundred to nine hundred dollars, and when I say complete, I mean it—lights, whistle, cushions, life preservers, flags, ground tackle, and everything—and when you figure that one gallon of gasoline will drive it from nine to ten miles, and that less than a gallon of paint and varnish will refinish the entire boat, you will know that it fits the average purse, and at the same time is a real boat that combines speed, seaworthiness and comfort to a remarkable degree, and at the same time is one you can be proud of at any yacht club float.

Building a Monoplane.

(*Continued from page 11.*)

after one 6 in. On top of these, and notched into them, fore and aft engine bearers, 1¾ in. x 4 in. to 6 in., should be run. Where the engine sets high it is well to make little braces by flattening the ends of ½ in. pipe and attaching these to the engine foundation and frame of the boat. This will stop the side vibration. The different members of the engine foundation, all of which should be of oak, should be fastened by through bolts riveted upon the ends, probably ⅜ in. in diameter. Too much importance cannot be attached to the necessity of having a rigid engine foundation, and the little extra weight involved in making a stiff foundation is more than offset by the lack of vibration. The fore and aft girders should be as long as possible. The rudder can be of either oak or metal. An oak rudder is shown in the plans with bronze casting for tiller. It is lighter and can be made by the builder. A wooden shaft log with stuffing-box bolted into it is much inferior to metal shaft log and stuffing-box. One of the self-aligning shaft hangers, or struts, are preferable. Their cost is slightly more than the ordinary kind, but are well worth while in the long run. Chocks, cleats, oarlocks, and other hardware, including the stemband, can now be fitted. A good addition to the boat is an automobile steering-wheel, which can be set up horizontally, with controls run forward to the engine, as shown.

The painting of the boat is a matter of taste. A boat of this kind looks well when left bright; that is, with all woodwork scraped and sanded down to a smooth surface, covered with a coat of shellac or some good filler, and two or three coats of varnish. The best marine spar varnish should be used. If desired the part below the waterline can be painted green or red, at the option of the owner. The inside of the boat also looks well if left bright and varnished. Should it be desirable to paint the boat, however, three or four coats of lead of good quality should be used, the last coat having some zinc mixed with it to give better results, and make it easier to wash off dirt.

Before painting the hull, however, the boat should be calked. One thread of cotton wicking is sufficient for this purpose, and may be put in with the calking iron or the roller. After painting the seams with paint, they should be puttied with white lead putty, colored the shade the boat is intended to be.

NAVAL ARCHITECTS & YACHT BROKERS

Piute II"—The most successful 21 footer—Speed, Seaworthiness, Comfort and Simplicity. Amateurs can build my original "V" bottom boats. Send stamp for illustrated circular of designs.
WILLIAM H. HAND, JR., Naval Architect, New Bedford, Mass.

Hand-Homer-Bath Marine Construction Co.
V-BOTTOMS
Simple for an amateur to build. Knock down or complete boats as desired
PRICES REASONABLE
A. P. HOMER, 159 State St., Boston
General Sales Agent, Bath Marine Construction Co

KROGMAN & PURDY
Yacht and Ship Brokers
HIGH GRADE YACHTS OF ALL TYPES FOR SALE AND CHARTER
92 State Street, Boston, Mass.
Correspondence Invited Particulars Furnished

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Yacht Designer and Builder
MARINE RAILWAY
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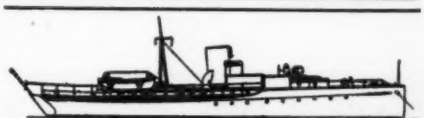
River Street, CHARLOTTE, N. Y.

FREDERIC S. NOCK
NAVAL ARCHITECT AND YACHT BUILDER
MARINE RAILWAYS, STORAGE, REPAIRS
EAST GREENWICH RHODE ISLAND



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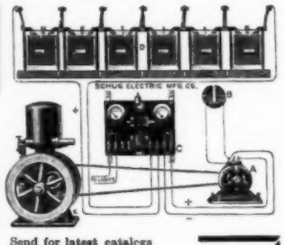

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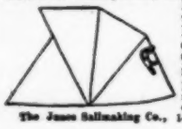

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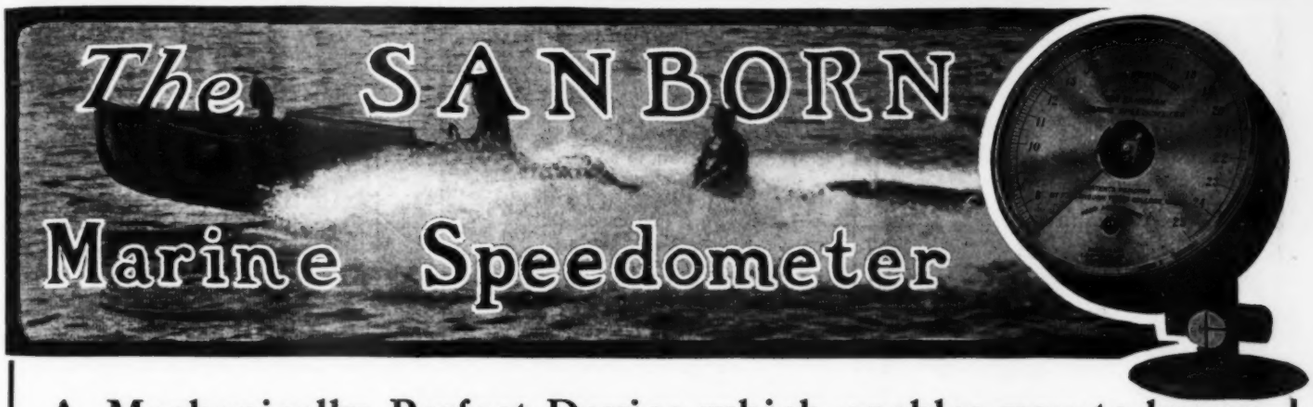

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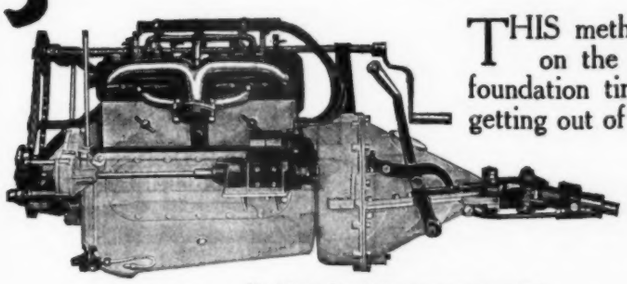

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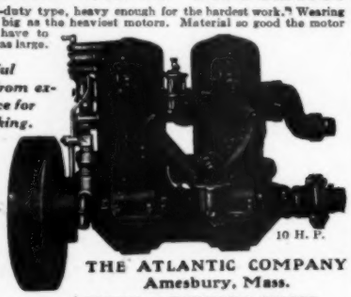

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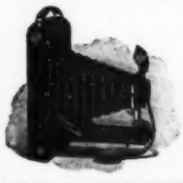

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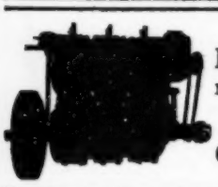

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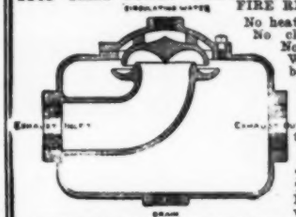

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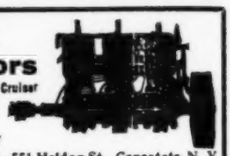

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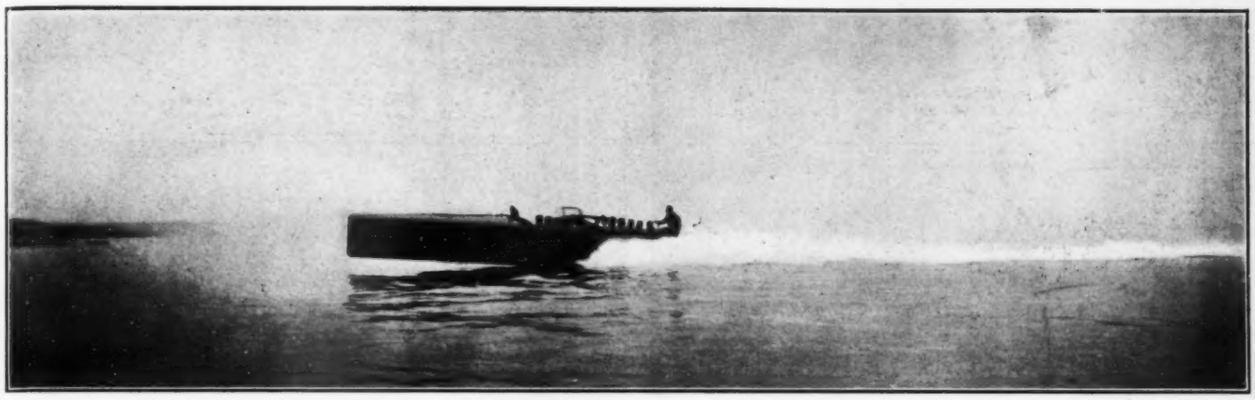

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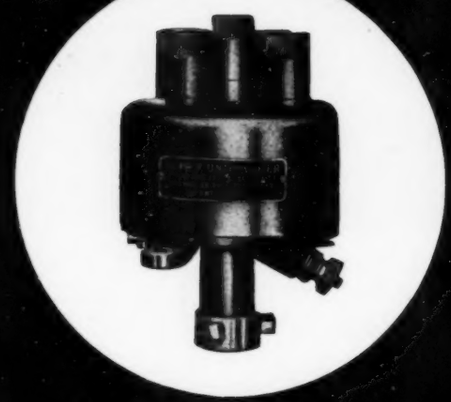

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